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UNIVERSITY OF TORONTO



REPORT OF THE DEAN  
OF THE  
FACULTY OF MEDICINE

SESSION 1944-1945

PRINTED IN CANADA  
THE UNIVERSITY OF TORONTO PRESS

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## FACULTY OF MEDICINE

*Toronto, June 30th, 1945.*

*To the Graduates in Medicine of  
the University of Toronto.*

*The Dean's Report for 1944-45 contains material of such unusual importance that it is sure to be of interest to all graduates. In it is outlined the new four year Medical Course which goes into operation in September, 1945, and which is based on the most careful study of modern medical education. In it, too, is a brief review of the contributions made by the Faculty and its alumni throughout the war, a record of which we may all be proud. It is the hope of the Faculty that through this Annual Report the interest of the graduates in their Alma Mater may be maintained and that the mutual goodwill so necessary to the glory of a School of Medicine may ever grow.*

W. E. GALLIE,  
Dean.



## REPORT OF THE DEAN OF THE FACULTY OF MEDICINE

The year 1944-45 will stand out in the history of the Faculty of Medicine as the one in which plans for the revision of the Medical Course were finally agreed upon and changes of the greatest importance introduced. For years the Faculty has been dissatisfied with the constitution of the six year course introduced in 1919 but it was only under the stimulus of the irritations suffered under "Wartime Acceleration" that the Council finally decided to make the necessary changes.

As a preliminary, Professors Watt and Cates made a careful survey and on January 28, 1943, presented a report in which they showed that it would be possible to compress the six year course, composed of six years of 30 weeks each, into a five year course of 36 weeks each, without any particular change in the course itself and without serious inconvenience to the students or the staff. The objection that students required a long summer vacation in which to earn enough money to pay their expenses did not seem important as it was shown that in practically all instances they obtained employment only between June 15 and September 7.

The Committee then took up seriously the question of what would really constitute an ideal course, keeping in mind the cost, the length of time required and the fact that internship after graduation is now considered imperative. The general consensus was that, if possible, the medical course should be built on a stronger foundation of premedical study in order that the student might acquire the elements of a liberal education as well as the necessary training in the basic sciences. This view was strengthened by the advice of Dr. Alan Gregg, Director of Education in the Rockefeller Institute, who met the Committee and later the Faculty, and after hearing our problem strongly advised that we raise our standard of premedical education.

The Committee wrestled with this problem in fortnightly meetings throughout the whole of 1944 and finally came to the conclusion that it would be possible to design a satisfactory course, composed of two years of 30 weeks each of premedical work of equivalent standing to an honour Arts course, and of four years in Medicine of 36 weeks each. The report of the Committee received the unanimous approval of the Faculty Council and subsequently of the Senate and the Board of Governors.

As this action of the University must be of the utmost interest to every graduate, the details are herewith outlined in excerpts from the Calendar, without reference to the difficulties and adjustments that are necessary to wind up the accelerated course and accommodate the applicants from the armed services. For these latter details a careful study of the new Calendar (1945-46) is necessary.

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### DOCTOR OF MEDICINE

A candidate for the degree of Doctor of Medicine is required to attend two premedical years of thirty weeks each and four medical years of thirty-six weeks each.

The new medical course which comes into operation for the first time in the session 1945-46, is designed to give the student, in the early part of his university career, some of the elements of a liberal education as well as the necessary training in the basic sciences. To this end there have been incorporated in the two pre-medical years certain subjects from the humanities, selected in the hope that the cultural horizon of the medical student may be widened and that he may thus be made more fit to assume those numerous extra-professional responsibilities which, in any community, fall on the shoulders of the doctor.



## FACULTY OF MEDICINE

## ADMISSION REQUIREMENTS

A candidate for admission to the first premedical year must submit satisfactory certificates of good character and of being at least seventeen years of age on or before the first of October of the year in which he proposes to register; only under exceptional circumstances will a candidate of thirty years or more be admitted. Owing to lack of facilities in the Faculty of Medicine, the Board of Governors has ordered that not more than 150 students are to be admitted to the First Premedical Year, hence all applications for admission will be held until September 1, when they will be considered by the Committee on Admissions. No application received after September 1 will be considered.

He must present the Ontario Secondary School Graduate Diploma in the General Course and the Ontario Grade XIII certificate, or equivalent certificates, showing that he has completed satisfactorily and obtained the required standing in certain prescribed subjects.

## SUBJECTS OF INSTRUCTION IN THE PREMEDICAL YEARS

*First Premedical Year*

Chemistry  
English  
Physics

One of History  
Philosophy

One of Anthropology

Botany  
Foreign Language  
History (if not chosen elsewhere)  
Mathematics  
Philosophy (if not chosen elsewhere)

*Second Premedical Year*

Biology  
Chemistry  
English  
Psychology

One of History  
Philosophy

One of Anthropology

Botany  
Foreign Language  
History (if not chosen elsewhere)  
Mathematics  
Philosophy (if not chosen elsewhere)

NOTE: Any optional subject taken in the First Premedical Year must be continued in the Second Premedical Year.

Candidates at the annual or supplemental examinations of the First Premedical Year who fail to secure standing necessary to qualify them for registration in the Second Premedical Year, will not be permitted to repeat the First Premedical Year.

## ADMISSION REQUIREMENTS TO THE NEW COURSE IN MEDICINE

A candidate for admission to the First Year of the New Course in Medicine is required to submit certificates showing (1) that he has completed the courses and obtained the academic standing required in each of the subjects of the First and Second Premedical Years or their equivalent; and (2) that he has taken a Medical Aptitude Test. Any candidate may be required to present himself to a member or members of the Committee on Admissions for a personal interview.

## SUBJECTS OF INSTRUCTION IN THE NEW COURSE IN MEDICINE

*First Medical Year*

Anatomy (including Embryology), Histology, Chemistry (Organic and Physical), Biochemistry, Physiology, Psychology.

*Second Medical Year*

Anatomy, Biochemistry, Physiology, Pathology, Bacteriology, Pathological Chemistry, Medicine (including Clinical Microscopy), Surgery, Obstetrics, Paediatrics, Psychiatry, Hygiene and Preventive Medicine.



*Third Medical Year*

Medicine, Surgery, Obstetrics and Gynaecology, Paediatrics, Ophthalmology, Oto-Laryngology, Psychiatry, Therapeutics, Physical Therapy, Anaesthesia, Radiology, Pathology, Pathological Chemistry, Pharmacology, Hygiene and Preventive Medicine, Medical Jurisprudence and Toxicology.

*Fourth Medical Year (1946-47)*

Medicine, Surgery, Obstetrics and Gynaecology, Paediatrics, Ophthalmology, Oto-Laryngology, Psychiatry, Therapeutics, Physical Therapy, Radiology, Hygiene and Preventive Medicine, Dermatology, Venereal Disease, Dentistry, Medical Ethics and Economics, Life Insurance, Applied Physiology, Social Medicine.

\* \* \* \*

From this outline it will be seen that in this new course of purely medical subjects, all the material contained in five years of the old course is fully covered. Some changes in the actual time-table, which include a reduction of the number of hours devoted to Surgery with an increase in the hours devoted to Medicine, Obstetrics and Paediatrics, are undoubtedly an improvement.

The amount of committee work necessary to decide upon such a radical change in the curriculum was very great but the Faculty is hopeful and indeed sure that the work was well worth while and that the change will constitute a great improvement and will eliminate for many years the dissatisfaction we have felt in regard to our course.

In deciding upon the new curriculum full consideration was given to all viewpoints. There were those, for example, who argued that any lengthening of the course was unwise, as it was already too long, having in mind the internships that must follow. This argument was met by increasing the number of weeks in each of the medical years and so avoiding increasing the number of years. Others thought that it might be well to insist on a degree in Arts as a requisite to admission to the medical course. This, however, would mean an increase of one or two years at the University, which seems unreasonable, particularly for those who must spend four or five more years in postgraduate work to become specialists. Further, there are no honour courses that fill the special requirements of medical students, that is, a combination of the sciences and the humanities. It was agreed by all that the Pass Course would be totally inadequate. So, with the assistance of the President and the Heads of Departments in the Arts Faculty, a course was designed in which in addition to the Sciences there was added a course in English specially suited to the needs of doctors and a course in History or Philosophy. To these were added the options mentioned above, with Psychology obligatory in the second year. It was the unanimous opinion of the Faculty that such a curriculum might well prove ideal.

There will, of course, be difficulties in fitting students who are already part way through the old course into the new, and there will be additional trouble owing to the great numbers of young matriculants now being demobilized from the armed forces who will wish to register in Medicine. Nevertheless, a draft of time-tables for the next few years indicates that ultimately order will be restored and that by the time the present accelerated course has come to an end we shall be firmly established in a new course of which we may all be proud.

Now that the war has ended it would seem appropriate that some reference should be made to the contributions that this Faculty has made to the war effort. These may be listed as (a) the providing of medical personnel to the Medical Services from the staff; (b) the keeping up of a steady supply of young officers to fill the urgent needs of the expanding Services; (c) the placing of the facilities of the Faculty and of all the affiliated hospitals at the service of the Medical Corps for the purpose of intensive instruction in whatever direction this was required; and (d) the concentrating of practically all research on the problems associated with war.



Of the staff almost all have served in one capacity or another and some for the whole duration of the war. This left the responsibility for the work in the laboratories and hospitals on the shoulders of the older members, many of whom had already reached the retirement age or did so during the war. Without their assistance and that of some volunteers the Faculty could not have carried on. In spite of the depletion of the staff, however, and of the additional strain caused by the acceleration of the course and curtailment of vacations, the work was carried on extraordinarily well and we feel confident that no graduate has suffered seriously because his undergraduate years were in war-time.

Of the 4,500 Medical Officers who have been commissioned during the war, this Faculty contributed the following:

Navy.....	157
Army.....	952
Air Force.....	277
Army & Air Force.....	1
Total .....	<hr/> 1,387

In addition the present intern year of 125 will be commissioned in February, 1946, making a grand total of 1,512. To this may be added another 125 who will graduate from the accelerated course in February, 1946; these are privates in the R.C.A.M.C. but will not be commissioned.

The details of the acceleration of the course are well known and have been described fully in previous Reports. The results were very much as was hoped and expected. By means of it the Medical Services of the Army, Navy and Air Force were provided with a graduating class every eight months instead of every twelve, and three classes every two years of the war instead of the usual two. Acceleration ultimately solved the shortage of Medical Officers. The difficulties and drawbacks experienced in making the radical change in the curriculum were great and called for much forbearance and devotion to duty on the part of the staff. It was done, however, and with much credit and distinction. Unfortunately the process of deceleration is just as difficult as that of acceleration, but it is hoped that by combining it with the establishing of the new course it can be accomplished with no more upset than either one of the processes would require.

The postgraduate courses for officers seconded from the Services were given in response to the urgent appeal of the Directors General for increased numbers of specialists of various kinds. They took the form of (a) courses for general Medical Officers; (b) courses for officers already partly trained in some specialty, consisting of six months' internship in hospital, in order that they might assume special responsibility upon return to the Services; (c) general refresher courses in which several departments co-operated, of four weeks' duration. The departments engaged in this type of war work were Medicine, Psychiatry, Radiology, Therapeutics (Anaesthesia), Ophthalmology, Hygiene and Preventive Medicine, and Surgery.

In the Department of Medicine special courses of instruction in Neurology and Psychological Medicine were given to Medical Officers at the request of the Director General of Medical Services. As in former years, provision was made for one Medical Officer from each of the Services (Navy, Army and Air Force) to receive special training in Internal Medicine for a six months' period and then return to duty with his respective Service.

The Department of Radiology undertook and carried out a very large programme of postgraduate teaching. Their problem was to provide Radiologists and Radiological Technicians for the rapidly increasing military hospital units. During the war this Department with the co-operation of the Departments of Physics, Anatomy and Pathology trained 74 Radiologists and 269 Technicians, all of whom returned to their respective Services and did excellent work.



The Department of Therapeutics responded to the appeal from the Services for trained anaesthetists by arranging for the special training over a period of months in the University hospitals of officers seconded for the purpose. All these officers became specialists in anaesthesia upon return to their Services.

The Department of Ophthalmology at the request of the Army and Navy organized a six months' intensive course in the rudiments of Ophthalmology and trained five officers sufficiently to make them of definite value upon their return to duty.

In the Department of Surgery the postgraduate work took the form of (a) courses on subjects of special importance in war; (b) senior internships in one of the surgical specialities for officers already trained in general surgery; and (c) residencies or senior internships in general surgery for our own ex-interns whose training had been interrupted by the war. In addition the Department took part in general refresher courses. From time to time well-trained surgeons were sent to us for short reviews on special subjects such as thoracic operative technique, neurosurgical technique and so on. They were given temporary staff appointments which enabled them to take an active part in the work.

The special courses consisted of a series of instructional periods of one week's duration on the technique of external pin fixation in the treatment of fractures. Fifty officers took these courses under the immediate direction of Colonel R. I. Harris, M.C. They were of great value in establishing a new method of fracture treatment on a sound basis.

The Department of Pathology in addition to taking part in the various refresher and special instructional courses given in the clinical departments, has also undertaken at the request of the Directors General of Medical Services, the intensive training of a group of six officers seconded to the Department for periods of six months.

The Department of Psychiatry at the request of the Directors General instituted short courses early in 1943 for the training of assistant psychiatrists. The selected officers pursued a course consisting of two months at the Toronto Psychiatric Hospital, two months in the neurological and psychiatric services at Christie Street Hospital and two months in the Department of Medicine on the Neurological Wards at Toronto General Hospital. In this course 34 officers were trained for the Army, 12 for the Air Force and 2 for the Navy, and subsequently did valuable work there.

During the war years 126 physicians received the Diploma in Public Health. In accord with a request from the Services to meet urgent requirements, the timetable for the course leading to the Diploma in Public Health in the session 1943-44 was accelerated by increasing the daily hours of instruction, reducing intermissions and eliminating holidays. This acceleration provided for the emergency at that time. Four candidates from the Navy and one from the Army were enrolled. In the session 1944-45 there were three candidates from the Navy, six from the Army and four from the Air Force.

An account of the researches conducted in our own laboratories has appeared in the reports of the various departments throughout the war. Many were financed by grants from the National Research Council and some from our own funds. The results in some cases were of the greatest importance. The list is a very long one and if presented here would be largely a repetition of what has appeared before. It might be of interest, however, to recall the following:

1. A long series of experiments performed by Professor G. H. W. Lucas of the Department of Pharmacology and Professor A. W. Ham of the Department of Anatomy on the toxicity of explosives. This involved a laborious study of the



tissues of hundreds of animals. Dr. Ham also studied the tannic acid treatment of burns and added evidence to support the statement that tannic acid is injurious both locally and after absorption in the liver.

2. In the Department of Biochemistry, under the direction of Professor Wasteneys, Professors Wynne and Young together with ten graduate students and three technicians, carried out extensive war research in chemistry for the Department of National Defence. The nature of these studies and their results are secret.

3. In the Department of Pathology, Dr. Philip Greey and his associates have been busy throughout the whole war with the study of the effect of the sulfonamide group of drugs and of penicillin and streptomycin on infection. They also developed a pilot plant for the manufacture of the first penicillin made in Canada and gave much assistance to the establishing of the penicillin plant of the Connaught Laboratories.

4. In the Department of Hygiene and Preventive Medicine, under the direction of Professor D. T. Fraser, Dr. Ronald Hare conducted extensive studies on the spread of streptococcal infection and control of influenza. Several papers were published. In this Department also important studies of the influence of the sulfonamides and penicillin on infection, particularly gas bacillus infection, were carried out.

5. The researches conducted in the Department of Physiology and the Banting and Best Department of Medical Research, under the direction of Professor Best, were so extensive and important that a special account of them is included in the reports of those Departments.

In 1937 an Associate Committee on Medical Research was established under the auspices of the National Research Council to organize and promote medical research in Canada. Through funds allocated to this Committee by Council, grants-in-aid for research were made to workers in many of the medical schools and teaching hospitals in Canada. At the outbreak of war, this Committee through its peace-time organization was able to initiate promptly and support the investigation of medical problems related to the war. Subcommittees were formed to study and co-ordinate work in certain special fields.

For the investigation of problems of special interest to the respective Services (Navy, Army and Air Force) an Associate Committee on Aviation Medical Research was first established and, later, Associate Committees on Naval and Army Medical Research. Through the National Research Council arrangements were made for the free exchange of reports of work in progress between the Associate Committees and corresponding research committees in Great Britain, the United States, Australia, New Zealand and South Africa.

The membership of these Associate Committees was composed almost entirely of medical scientists from different medical faculties in Canada. Forty or more members of the Faculty of Medicine of the University of Toronto served on these Associate Committees and Subcommittees or worked on war projects sponsored by these Committees as Medical Officers in the Services, Navy, Army and Air Force. Almost every department of the Faculty of Medicine became a centre for the investigation of medical problems related to the war and workers in these departments made many valuable contributions to our knowledge of problems relating to aviation and naval medicine, shock, infections, vaccines and chemotherapy. Graduates and members of the Faculty may feel justly proud of this contribution to the war effort.

The late Sir Frederick Banting was the first Chairman of the Associate Committee on Medical Research, and was responsible for the establishment, prior to the war, of a Committee on Aviation Medical Research which later became the Associate Committee on Aviation Medical Research of the National Research Council. He was its first Chairman and before his tragic death in February, 1941, his de-



partment in the University had become the chief centre for aviation medical research in Canada. Professor Duncan Graham, the Vice-Chairman of the Associate Committee on Aviation Medical Research, was appointed Chairman and a member of the National Research Council in succession to Sir Frederick Banting.

Professor Best (Surgeon Captain) and Dr. W. Hurst Brown (Colonel) served as Chairmen of the Associate Committee on Naval Medical Research and the Associate Committee on Army Medical Research, respectively. Professor Best in association with Professor Solandt made Toronto the chief centre for naval medical research.

#### *Committee on Nutrition*

In November, 1941, Professor Hunter was appointed Chairman of a Standing Committee on Nutrition set up by the Department of National Defence to advise on the rationing of the Army and Air Force in Canada. The terms of reference of the Committee have since been extended to cover matter relating to the rationing of all the armed forces. This Committee, of which Professors Wasteneys, Tisdall, Best and McHenry are members, has functioned ever since and has made recommendations which have led to great improvement in the whole problem of rationing.

#### *Canadian Orthopaedic Unit*

The end of the war in Europe brought to a close the service of the Canadian Orthopaedic Unit which was organized in 1941 by the Canadian Red Cross and sent to Scotland where it was established at Hairmyres as a unit of the Emergency Medical Service. This Unit was organized in this University under the direction of Dr. A. B. LeMesurier, Surgeon-in-Chief, and Miss Alice Hunter, Matron, and carried on most successfully throughout the war. When the Unit finally returned to Canada it brought with it the gratitude of the Department of Health for Scotland and the personal thanks of the Secretary of State (the Right Honourable Joseph Wedgewood, P.C., M.P.), who came down to Hairmyres to say good-bye.

#### *Plans for the Rehabilitation of Medical Officers upon Demobilization*

As predicted in last year's Report, plans have been completed for providing postgraduate training for officers returning from overseas. Commencing this autumn (1945), refresher courses of two months' duration will be provided for groups of 60 officers four times each year, with a breathing space between each course and during July and August. These courses will be made up of lectures, bedside clinics and laboratory sessions, designed to enable the officer who has been out of touch with general practice to review once more the essentials. For others who want a review of some special subject or group of subjects, special arrangements will be made.

To meet the demand for specialist training which will come not only from returning officers who have been our own rotating interns but also from others who wish to be certificated as Specialists, it has been arranged that there will be a broad increase in the senior intern appointments available in each of the four University hospitals. As this will naturally reduce the number of patients per intern, a plan has been developed whereby these interns will receive refresher courses in the basic sciences applicable to the specialty, so that they will be prepared for the examinations for Fellowship in the Royal College or for certification as Specialists.

In addition the Faculty is committed to a general programme of postgraduate teaching.

#### *Department of Art as Applied to Medicine*

For the past nineteen years medical illustration in all forms, with the exception of photography, has been provided by an Art Service under the direction of Miss



M. T. Wishart. The artists for this Service were trained under Professor Brödel at Johns Hopkins University. With the death of Professor Brödel, however, that school lost its pre-eminence and our Faculty decided that the time was ripe for the establishment of a school here. A Department of Art as Applied to Medicine has accordingly been organized which will not only continue to assist other departments by providing first-class drawings but will also undertake the training of artists in the field of medical illustration.

The course extends over three academic years and includes instruction in Anatomy, Pathology, Drawing and the various techniques employed. A diploma will be awarded on successful completion of the course.

### *Convocation*

Convocation was held this year on February 16 and was addressed by the Honourable Percy Vivian, Minister of Health for Ontario. As on the past four occasions, when convocation was held separately from the general University convocation, the hall was packed and great interest was shown in the graduation of the students. This augurs well for future convocations which, because of the lengthening of the course by six weeks, will probably be held towards the end of June, several weeks after the rest of the University has closed.

### *Student Advisers*

For a long time it has been felt that the contacts of the student of today with the staff have been too limited and that some change should be made that would encourage a greater intimacy between student and teacher, particularly in the earlier years of the course. To this end a group of staff members has been appointed who will be known as student advisers, whose business it will be to act as guides and friends to small groups of students. It is hoped that by this means the barrier of reserve which for so long separates the student from the teacher will be broken down and that the problems and difficulties which confront all students in their early years will be brought to a quicker solution.

### *Charles Mickle Fellowship*

The Charles Mickle Fellowship for 1945 has been awarded to Professor B. A. Houssay, M.D., Professor of Physiology of the University of Buenos Aires, for his outstanding work, especially with regard to the endocrine glands and arterial hypertension. It is hoped that some day he will be able to visit this country and address the students and Faculty.

### *Special Lectures*

The fourth Banting Memorial Lecture was delivered on March 3, 1945, by Surgeon Captain C. H. Best. This lecture, besides being a delightful presentation of the subject which has made this University famous, was of great historical value as it dealt with many incidents in the discovery and development of insulin which could only have been known to a collaborator.

The Balfour Lecture was delivered on November 24, 1944, by Doctor B. P. Watson, Professor of Obstetrics and Gynaecology, of Columbia University, formerly Professor of Obstetrics and Gynaecology in Toronto and in Edinburgh. Professor Watson's subject was "Puerperal Sepsis" and he spoke in the well-remembered style that always made his lectures so popular. Convocation Hall was crowded and the reunion was a very happy one.

### *Military Honours*

Military honours were awarded during the year to the following members of the staff and Fellows:



<i>Rank and Name</i>	<i>Honour</i>	<i>Date</i>
Captain W. R. Dalziel,	M.C.	May, 1944.
Lieutenant-Colonel R. C. Dickson,	C.B.E.	January, 1945.
Wing Commander J. K. W. Ferguson,	M.B.E.	June, 1945.
Brigadier J. A. MacFarlane,	O.B.E.	January, 1945.
Major W. T. Mustard,	M.B.E.	April, 1945.
Brigadier C. A. Rae,	C.B.E.	January, 1945.
Lieutenant-Colonel Jas. W. Ross,	O.B.E.	June, 1944.
Major H. V. Slemon,	Mentioned in Despatches	June, 1944.

### *Civilian Honours*

In May, 1945, the University of Western Ontario conferred upon Professor Duncan Graham the degree of Doctor of Science, *honoris causa*. Dr. R. I. Harris was made an honorary member of the British Orthopaedic Association. Dr. E. H. Botterell was made an honorary member of the British Neurological Society. Dean Gallie was made an Honorary Fellow of the Association of Surgeons of Great Britain and Ireland.

Appointments of interest among the staff included the following:

Dr. G. E. Richards, Head of the Department of Radiology, to be Managing Director of the Ontario Cancer Treatment and Research Foundation.

Dr. Beverley Hannah to be Medical and General Superintendent of Riverdale Isolation Hospital.

Brigadier W. P. Warner, formerly Officer in Charge Medicine, No. 15 General Hospital, and later Consultant in Medicine (Army), was appointed Deputy Director General of Medical Services in July, 1944. In March, 1945, he resigned from the Army to receive the appointment of Director General of Treatment Services, Department of Veterans' Affairs.

Dr. R. W. I. Urquhart was appointed the representative of the Faculty of Medicine on the Council of the College of Physicians and Surgeons of Ontario and the Medical Council of Canada. He replaces Dr. E. S. Ryerson who has represented the Faculty on these Councils for many years and served a term as President of each of these bodies.

*Charles E. Frosst Scholarship.*—A Scholarship of \$250.00 will be awarded annually to a student entering the final year of the new medical course. This Scholarship is the gift of the Charles E. Frosst Company and is designed to assist deserving students who find themselves in financial difficulty in the final year of the course.

*Jay J. Allen Award.*—The Jay J. Allen Award, of the value of \$75.00 a year for three years (a total of \$225) is awarded annually to a student registered in the Second Year in the Faculty of Arts or the First Medical Year in the Faculty of Medicine.

It is with deep regret that I must record the death of Doctor V. E. Henderson, Professor of Pharmacology for nearly forty years. Professor Henderson was a pillar of strength in the Faculty, spending his whole time after graduation in 1902 in working devotedly to improve the standards of medical training in this University. In addition he was much interested in the non-academic side of the students' life and was a member of the Board of Stewards of Hart House for over twenty-five years. His loss is greatly mourned by the whole staff and student body of the University.

I regret also to record the death of Miss Wilma Jones, for many years Assistant to the Secretary in the Medical Office. Generations of our graduates will remember her and recall the never failing understanding and kindness with which she met their problems.



## MEDALS, SCHOLARSHIPS AND PRIZES

*Awarded at Convocation, February, 1945*

The Cody Gold Medal.....	K. F. Clute
The Cody Silver Medal.....	J. V. Basmajian
The Cody Silver Medal.....	H. Kalant
The William John Hendry Memorial Scholarship in Obstetrics and Gynaecology.....	H. Kalant
The Chappell Prize in Clinical Medicine.....	K. F. Clute
The Ontario Medical Association Prize in Hygiene and Preventive Medicine.....	W. R. Harris
The Dr. Roy Simpson Scholarship in Paediatrics.....	Miss E. V. Duggan
The David Dunlap Memorial Scholarship—Sixth Year.....	H. O. Barber

*Awarded at Other Periods*

The Ronald S. Saddington Medal in Pathology.....	E. H. Schmidt
The John Copp Bursary.....	J. W. Hazlett
The Posluns Brothers Scholarship.....	R. H. Sheppard

## REGISTRATION OF STUDENTS IN THE FACULTY OF MEDICINE

SESSION 1945-1946

First Year (Ex-Service) .....	154
First Premedical Year .....	150
First Medical Year .....	170
Second Medical Year .....	123
Third Medical Year .....	129
Sixth Year .....	136
Diploma in Public Health .....	36
Diploma in Industrial Hygiene .....	1
Diploma in Psychiatry .....	4
Diploma in Radiology .....	5
Art as applied to Medicine .....	5
Graduate Students .....	2
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	914

## ANATOMY

*Under the direction of Professor J. C. B. Grant*

During the past year 628 undergraduate students received instruction in this Department. There were also 59 graduate students and 5 occasional students, making a total of 692.

Not all the students studying Anatomy were medical students, as the accompanying list shows:

Second Year Medicine, 123; attached from Medical Art Service, 1; attached from Physiotherapy Teachers' Course 3; Third Year Medicine, 126; Physiotherapy, I Year, 76; Physiotherapy, II Year, 41; Occupational Therapy, I Year, 99; Occupational Therapy, II Year, 40; Physiology and Biochemistry, III Year, 13; General Course in Arts, III Year, 1; Dental Students, II Year, 48; Physical and Health Education, II Year, 21; Physical and Health Education, III Year, 20; Optometry, 16.

It may be noted that last year there was a considerable increase in the number of women beginning the study of medicine. Thus, out of a class of 123 students in the Second Year of Medicine, 22 were women, whereas in the previous year (1943-1944) 14 out of 126 students were women.

In planning the new curriculum the Faculty Council thought it wise to shorten still more the number of hours apportioned to the study of Anatomy. As the decision was arrived at when the session was well advanced and as it affects the students at present studying Anatomy, a slight disturbance was created in the timetable, and as a result the study of the head and neck must be somewhat compressed.



Professor J. C. Watt gave three courses of lecture-demonstrations in Anatomy to members of the School of Nursing, to graduate dentists taking a short refresher course in the Faculty of Dentistry, and to a class of radiologists in the armed forces who were working under the direction of Professor G. E. Richards.

Professor W. H. Piersol, although he had retired officially last year from the teaching staff, was requested, owing to shortage of staff, to give once more the lectures on Embryology. This he did willingly, and we are very grateful to him.

Dr. Margaret Abel, who of recent years has been a guest in this country, and who has acted as Demonstrator of Anatomy, returned to England at the end of May. The Department is grateful to her for the admirable assistance she rendered during this period and it appreciates her courage in undertaking the arduous task of re-learning Anatomy in order to teach it to medical students in a time of urgency.

The Histology division of the Department is becoming increasingly active. Professor A. W. Ham gave separate courses on Histology to medical, dental, physiological and biochemical, and physical and health education students. Research work, as is mentioned later, was actively carried on. It is gratifying to be able to record that Professor Ham obtained a substantial grant with which to carry on cancer research during the coming year.

Dr. Y. K. Beh, who for the past year has been working in the Department fitting himself to teach Histology on returning to West China Union University, Chengtu, China, has proved himself to be most thorough, capable, and effective both as a research worker and as a teacher. We are sorry that he must leave us.

## RESEARCH

### *Under the direction of Professor A. W. Ham*

Dr. Y. T. Beh completed a histological study of the development of the pancreas of the rabbit with particular reference to the origin of alpha and beta cells. He found that extremely few beta cells were present before birth but that numerous ones developed early in postnatal life.

Dr. Margaret Armstrong, with the aid of a grant from the Banting Research Foundation, continued her study of the fate of adrenal autografts and homografts in the rat. She also investigated the effect of injecting certain hormones on the growth and differentiation of spontaneous mammary tumours in mice.

A study, made in collaboration with Dr. Lucas of the Department of Pharmacology, and assisted by a grant from the National Research Council, on the effect of fatty diets and fatty livers on the susceptibility to poisoning with certain explosives, was completed.

The pathology of burns and the effects of the tannic acid treatment, as well as the toxicity of tannic acid, were further investigated experimentally with the aid of a grant from the National Research Council.

In collaboration with Dr. George Cloutier, the fate of full-thickness skin autografts and homografts was investigated experimentally in pigs, and special studies were made on the rate and manner of vascularization in them.

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———Experimental study of the tannic acid treatment of burns with particular reference to its effect on local fluid loss and healing (*Annals of Surgery*, vol. 120, 1944, pp. 698-706).

RIDOUT, J. H., HAM, A. W. and WRENSHALL, G. A. See under Banting and Best Department of Medical Research.



**ART AS APPLIED TO MEDICINE**

*Under the direction of Miss Maria T. Wishart*

During the war years the educational value of medical illustration has increased. Various subcommittees of the National Research Council have found the importance of word and picture illustrations to demonstrate their research findings, and clarify their written word. This year Miss E. Hopper (Mrs. John Ross) completed for Col. R. I. Harris illustrations of "Shouldice's Technique of Repair of Indirect Hernia," for army records. Miss Drummond illustrated new types of uniforms as designed and developed by the Naval Co-ordinating Committee on Protective Clothing. Also, as reported previously, illustrations were prepared for the Subcommittees on Shock, Orthopaedic Surgery, Aviation Protective Clothing, and Aviation Medicine. Thus indirectly the work of this department has made a contribution to the war effort.

Miss Wishart was invited to represent Canada as one of a committee of five to organize an International Association of Medical Illustrators. This has proved a heavy undertaking, but one which will pay dividends in wider contacts and more comprehensive knowledge of the different approaches which today supplement the "fine arts" in the field of medical illustration, such as modelling, plastics relative to prosthesis, still and moving photography, animated drawings, poster work, etc.

The initial step to convert the Medical Art Service into a combined illustration and teaching department was taken when "at the meeting of the Council of the Faculty of Medicine held Dec. 1st, 1944, it was agreed to recommend to the Senate that a department of the Faculty of Medicine called 'Art as Applied to Medicine,' be established and that this department be administered under the Faculty of Medicine in a manner similar to other departments." This has been an urgently required development for some years, but will be a difficult undertaking until such time as the space allotted to the department can be adequately increased.

**BIOCHEMISTRY**

*Under the direction of Professor H. Wasteneys*

The staff of the Department was unchanged except that Professor Young was promoted to full professorship and one of the teaching Fellows, Miss Emmett, was replaced by Mr. Morgan. Dr. Bruce Crocker and Mr. Donald Laughland are both on active service with the R.C.A.F. and R.C.N.V.R. respectively. Dr. J. Manery Fisher, in addition to her work as Demonstrator, again held the position of Special Lecturer in Zoology in charge of the section of Animal Physiology formerly administered by Dr. Kenneth C. Fisher, now on leave of absence from the University and with the forces.

The arrangement of courses given in the Department remained the same as for the previous year. I feel it my duty to point out that in consideration of the numbers of medical, dental and Arts students receiving instruction, the Department is understaffed with full-time senior members, and it is impossible to do justice to the possibilities presented by large laboratory groups. In my opinion there should be a senior instructor in charge of every twenty-five undergraduate students during every laboratory period in order that proper supervision and inspiration may be given. This would require a minimum staff of six senior members. During the past few years we have had to manage with half that number.

Professors Wynne and Young, together with ten of the graduate students and three technicians, have devoted all the time which remained after essential academic duties had been performed to war research for the Department of National Defence.



Two graduate students, J. A. McCarter M.A., and W. D. Graham M.Sc., received the Ph.D. at the spring convocation. Their theses embodied investigations carried out on behalf of the Directorate of Chemical Warfare, Ottawa.

The total number of students registered in the Department during the session 1944-45 was 404. This number was made up of 250 medical students, 10 students of the General Course, 16 Physiology and Biochemistry, 6 Biology, 1 Chemistry, 2 Chemical Engineering, 38 Household Economics, 2 Household Science, 53 Dentistry and 26 graduates. Of the graduate students 24 were candidates for the Ph.D. degree, 1 for the M.A.; one was an occasional student. Thirteen were taking Biochemistry as a minor for degrees in other departments and 11 were taking their major work in Biochemistry.

### HYGIENE AND PREVENTIVE MEDICINE

*Under the direction of Professor D. T. Fraser*

The enrolment of graduate students in the course for the diploma in Public Health for the session 1944-45 numbered twenty-nine, which is the largest class up to the present time. The following provinces were represented: Ontario, 14; Quebec, 8; British Columbia, 1; Manitoba, 1; New Brunswick, 2; China, Jamaica and Newfoundland, 1 each. Five students were Rockefeller Foundation Fellows, one a Connaught Laboratories Fellow, and thirteen were from the armed forces. Including the students of this year, the total number enrolled since 1911 is 319.

As previously, courses of instruction in Bacteriology, Immunology and Parasitology were given to these students in the course leading to the diploma in Public Health, and also to suitably qualified graduate students.

During the session two field courses were held, one from September 5 to 16, 1944, and the other from June 11 to 23, 1945, for the medical students. It is a pleasure to acknowledge the full co-operation of the Department of Health of Ontario and the Department of Public Health, Toronto, in allowing the members of their staff to assume this added burden.

Laboratory courses and lectures were given as usual to the students in the second year in Pharmacy, second- and third-year Household Science and Household Economics, third-year Physiology and Biochemistry, third-year Physical and Health Education and to students in the School of Nursing; also to six students registered in the course for the diploma in Veterinary Public Health, three for the diploma in Dental Public Health, and one for the certificate in Public Health.

The enrolment for the session has been as follows:

Candidates for the diploma in Public Health .....	29
Candidates for the diploma in Veterinary Public Health .....	6
Candidates for the diploma in Dental Public Health .....	3
Candidate for the certificate in Public Health .....	1
Graduate students .....	7
Faculty of Medicine, fifth year .....	135
Faculty of Household Science, second and third years .....	2
Faculty of Arts, second, third and fourth years .....	111
Ontario College of Pharmacy, second year .....	40
School of Nursing .....	121
Physical and Health Education .....	21
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	476

### MEDICAL JURISPRUDENCE

*Under the direction of Dr. K. G. Gray and Professor W. L. Robinson*

The introductory lecture dealt with the sources of law, including the Common Law, Dominion and provincial legislation and delegated legislation. The



following lectures dealt with the licensing of professional organizations, particularly medical practitioners and members of the nursing profession. Some time was devoted to the Dominion and provincial legislation for the control of drugs. The constitution of courts in Ontario and their jurisdiction in criminal and civil matters was discussed. Attention was directed to the principles governing evidence, with special reference to the role of the expert witness. Considerable time was devoted to the study of legal principles relating to mental illness. The establishment and operation of public and private hospitals and sanatoria and the civil liability of doctors and nurses in hospitals were considered. Some time was devoted to the study of recent legislation in the field of health insurance.

### MEDICINE

*Under the direction of Professor D. Graham*

In the past year the accelerated programme of undergraduate training has been carried out as in the previous three years and special emphasis given to medical problems presented by the war.

The special courses of instruction in Neurology and Psychological Medicine to Medical Officers, given at the request of the Directors General of Medical Services, were continued throughout the past year. As in former years, provision was made for one Medical Officer from each of the Services (Navy, Army and Air Force) to receive special training in Internal Medicine for a six-month period and then return to duty with his respective Service.

Fourteen of the fifteen members of the active staff on active service referred to in the last Annual Report have remained on duty with the armed forces. Colonel A. R. Hagerman, who retired from the Army, rejoined the staff of the Department. In the past year Colonel W. P. Warner, D.S.C., Consultant in Medicine (Army), was appointed Deputy Director General of Medical Services and promoted to the rank of Brigadier. For a period he served as Acting Director General of Medical Services. More recently he has retired from the Army and accepted another important post in the Department of Veterans' Affairs as Director General of Treatment Services.

The following members of the staff have continued to give their services to the Army in this Military District one-half day a week as Consultants in Medicine: Drs. F. C. Hamilton, J. Hepburn, E. J. Maltby, Trevor Owen, and H. E. Rykert.

The Head of the Department has been reappointed a member of the National Research Council and has continued to serve as Chairman of the Associate Committee on Aviation Medical Research and of the Subcommittee on Infections of the Associate Committee on Medical Research. Wing Commander R. F. Farquharson was elected a member of the Associate Committee on Medical Research of the National Research Council.

In May, 1945, the University of Western Ontario conferred upon the Head of the Department the degree of Doctor of Science *honoris causa*.

The Department is pleased to report that Dr. A. A. Fletcher has recovered from his long illness and will resume his work with the Department in the coming year.

The Department regrets to announce that the following members of the staff have tendered their resignations: Dr. Goldwin Howland and Dr. Julian Loudon, Assistant Professors of Medicine, and Dr. F. W. Rolph and Dr. W. P. Warner, Associates in Medicine.

Dr. Howland has been a member of the Department for forty years. Since 1919 he has been in charge of teaching in Neurology and Psychological Medicine. Although he had reached the retiring age a few years ago, he kindly consented to



continue teaching until the end of European hostilities. In June last Dr. Julian Loudon, a member of the Department on the Attending Staff of St. Michael's Hospital, tendered his resignation as Physician-in-Chief of St. Michael's Hospital after twenty-five years of service in this capacity. As Physician-in-Chief of St. Michael's Hospital, Dr. Loudon held the rank of Assistant Professor of Medicine in the Department of Medicine of the University. Dr. F. W. Rolph, another senior member of the Department, retired from practice during the year and tendered his resignation from the staff of the Department in order that he might accept a whole-time appointment as Medical Examiner with the Confederation Life Association. To these three members of the staff the Department would express its thanks for the many years of valuable service they have rendered.

Upon his acceptance of an appointment with the Department of Veterans' Affairs as Director General of Treatment Services, Dr. W. P. Warner, who had been on leave of absence from the University since his enlistment in the Army in 1939, tendered his resignation. Dr. Warner was the first of a long line of Resident Physicians of the Toronto General Hospital and Fellows in Medicine who are serving with distinction in the field of Internal Medicine. The Department regrets the loss of Dr. Warner as a member of the staff but is pleased that one of its members has been selected for the high office of Director General of Treatment Services in the Department of Veterans' Affairs.

The Department is pleased to record that Dr. F. S. Brien, a graduate of the University and a former Senior Intern in Medicine at the Toronto General Hospital, has been appointed Professor of Medicine at the University of Western Ontario and Physician-in-Chief of the Victoria Hospital, London. At present Lieutenant-Colonel Brien is serving with the Army on the Continent as Officer in Charge of Medicine at No. 10 Canadian General Hospital.

### *Research*

In collaboration with the Insulin Committee of the University, Dr. W. R. Campbell is now engaged in testing out certain new insulins which show promise of providing a greater breadth of control of diabetes mellitus of the severe type.

Recently some new synthetic drugs have been produced which have a profound effect on the thyroid. Their discovery encourages the hope that a better control of thyroid disturbances may be accomplished. During the past year Dr. W. R. Campbell has made a study of the properties and application of one of these new drugs, thiouracil, in the treatment of hyperthyroidism. The results show that in all cases of hyperthyroidism the metabolic rate can be controlled, the patient's nutritional state improved, and other conditions militating against successful surgical intervention may be treated adequately before operation. In some cases, medical treatment with the drug—without subsequent operation—may effect a cure of hyperthyroidism. While thiouracil treatment eliminates certain dangers concomitant with previous methods of treatment, the drug requires considerable care in its application to avoid certain other dangers and further study is necessary to obtain the best results from its use.

In recent years a fourth lead has been added to the three standard leads used in the electrocardiogram to enhance the value of this method of examination. In order to determine the value and limitations of electrocardiographic examination, using the three standard leads plus Lead IV, Dr. C. R. Burton has reviewed the electrocardiographic records of all proven cases of cardiac infarction admitted to the Medical Service of the Toronto General Hospital since 1938. He found that Lead IVF presented the sole electrocardiographic evidence of recent anterior cardiac infarction in 19 per cent of 152 cases, and of old cardiac infarction in 48 per cent of 97 cases, and had a definite advantage over the three standard leads in contributing to the electrocardiographic diagnosis of 82 per cent of recent and of 56



per cent of old anterior infarction cases. A report of this study will be published shortly.

Members of the staff on active service have continued to study and report upon war medical problems. Lieutenant-Colonel Richardson and Major Walters submitted a report on the use of electroconvulsive therapy in the treatment of mental disturbances. Major N. M. Wrong has published a report of his study on penicillin therapy in pyogenic skin infections.

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#### OBSTETRICS AND GYNAECOLOGY

*Under the direction of Professor W. A. Scott*

The routine work of this Department during the past year has continued to put a heavy burden on the staff, but several papers have been written by members of the staff which either have been or will shortly be published.

The Head of the Department took part in a summer school at Vancouver last year.



The Department has concerned itself with plans for instruction of doctors being demobilized from the armed forces, and with provision for the training as specialists of as many applicants as possible. Both of these problems present difficulties because of the limited amount of clinical material. We feel, however, that we can provide a course in Obstetrics and Gynaecology for small groups of men going into general practice which we believe will be of value. The prolonged training of men wishing to become specialists is a more difficult problem, but we believe that means can be devised to train a few more men in the immediate post-war period than we did in the same length of time in the past.

The change in the medical course recently decided upon by the Faculty of Medicine has provided an opportunity which we believe will improve markedly the undergraduate training in Obstetrics and Gynaecology. In the last year of the new course Obstetrics and Gynaecology will be combined with Paediatrics, and a greater opportunity will be available for intensive training of the undergraduate.

Colonel M. C. Watson and Surgeon Commander J. R. McArthur have both obtained their discharge from the armed forces and are again on duty. The former has resumed the direction of a clinic in endocrinology, with a more elaborate program than obtained in the past.

### OTO-LARYNGOLOGY

*Under the direction of Professor A. A. Campbell*

Owing to a shortage of staff, there has been very limited opportunity for research.

Considerable study was given to complete oesophageal obstruction and a new method has been devised for the canalization of the oesophagus in case of complete obstruction.

Further studies were given to the treatment of Ménière's disease by histamine, and the report has been published in the *Canadian Medical Association Journal*.

In the Oto-Laryngological Department of the Hospital for Sick Children, Dr. D. E. S. Wishart has continued his research on the causes, effect, and treatment of deafness in children.

At the School of Aviation Medicine, Royal Canadian Air Force, Dr. J. A. Sullivan has continued his research on the "Effect of Flight upon the Middle Ear."

### PAEDIATRICS

*Under the direction of Professor Alan Brown*

In co-operation with the Connaught Laboratories, studies have continued on the epidemiology, prophylaxis and treatment of various infectious diseases. In whooping cough it has been found that a combination of cough plate and nasal mucous cultures will detect more cases of the disease than either alone. Observations are under way leading to the development of more rapid diagnostic methods. The therapeutic effect of hyperimmune human antipertussis serum is being studied. The present impression concerning the use of this serum is that cases of whooping cough admitted to the Hospital for Sick Children in critical condition have been cured through its use and that the course of the disease has been shortened. The use of large doses of sulphonamides and penicillin has lowered the death rate in acute purulent meningitis. In tetanus a marked reduction in case fatality has been brought about through the use of large doses of serum administered intramuscularly combined with the use of sedatives which have a prolonged action.



Means are being sought of delaying the absorption of pollen extracts which are used by the subcutaneous route in the prevention of hay fever. Polyvinyl alcohol RH623 has been found to retard absorption of egg white in sensitized laboratory animals. By admixture of polyvinyl alcohol with the pollen extract used in the prevention of hay fever it has been found that the dosage may be increased more rapidly and the number of injections to which the patient is subjected may be reduced to one-half that previously necessary. A series of cases of papular urticaria have been followed and it would appear that the fundamental cause of this condition is a food allergy.

Investigation of the cause, prevention and treatment of coeliac disease is being carried out. Coeliac disease has been produced in experimental animals and methods of prevention and cure are being studied in these subjects.

In co-operation with the Faculty of Dentistry, the effect of special diets used in the treatment of coeliac disease on tooth growth and development and the incidence of dental caries is being observed. The effect of minerals and vitamin D in prevention of dental caries is also being followed.

In co-operation with the Department of Biology, the incidence of inherited factors is being studied.

Studies are being carried out on jaundice of the newborn, especially icterus gravis, including the value of the Rh factor determination in diagnosis and treatment.

Work is being done on cystic fibrosis of the pancreas, including the therapeutic use of large doses of the B group of vitamins, vitamin A and pancreatic enzymes.

Studies are being continued on the effect of riboflavin in the prevention of corneal vascularization in experimental animals.

Over the past two years measurements have been made, using the photo-electric colorimeter, on the haemoglobin of healthy young adults. The average haemoglobin value per 100 c.c. of morning fasting venous blood was found to be 14.5 gms. in the male and 12.9 gms. in the female. Haemoglobin in finger-prick blood was found to average 1.1 gms. higher than venous blood taken at the same time. No seasonal variation in venous blood haemoglobin was found. A relationship between haemoglobin formation and ascorbic acid intake has been suggested. However, in groups of young adults with an average daily intake of 16.1 mgms. of iron in food who had received respectively average daily intakes, as determined by food analysis, of 7.9, 22.3 and 78.3 mgms. ascorbic acid over a period of eight months, no difference in haemoglobin values was found.

In co-operation with the Horticultural Department of the Ontario Agricultural College, Guelph, studies are being continued on the ascorbic acid content of Ontario-grown fruits and vegetables. Plant breeding observations are under way in an attempt to develop new varieties of tomatoes having a higher ascorbic acid content than those which are now being grown.

A co-operative effort involving the Ontario Department of Agriculture, the Agricultural College at Guelph and this Department is under way in which vitamin A and carotene determinations will be made on specimens of butter obtained from creameries located throughout the province. Figures obtained will be correlated with season, herd, ration, breed, etc.

An investigation has been made of the thiamine, riboflavin and niacin content of canned meat products, including not only those varieties regularly found on the Canadian retail market but also some preparations proposed for use in European re-establishment. In general solid meat packs rate highest in these vitamins, in thiamine content the pork products being outstanding. Stews, sandwich spreads, devilled materials and jellied products are lowest in these "B" vitamins due to a lowered solid meat content. In the preparation of some of these canned products considerable vitamin losses have occurred and investigations are under way in an attempt to increase the retention in the finished product.



A study was made in conjunction with the Poultry Husbandry Department of the Ontario Agricultural College of the efficiency of hens in transferring riboflavin from the chicken feed to the eggs and the effect of varying the riboflavin content of the feed on the riboflavin content of the eggs produced. It was found that chickens in pens transferred about one quarter of their riboflavin intake to the eggs when the feed contained 1.3 mgs. of riboflavin per pound. The proportion of the riboflavin consumed that was transferred to the eggs decreased if the feed contained either more or less than this optimum amount. Increasing the riboflavin from 1.6 to 2.2 mgs. per pound of feed did not increase the riboflavin in the eggs. Chickens fed riboflavin at the optimum level produced eggs containing 50 per cent more riboflavin than when the ordinary laying ration was used. Furthermore, it was observed that chickens kept in batteries produced eggs with a higher riboflavin content and were more efficient in transferring the riboflavin to the eggs than when kept in pens.

In co-operation with the Department of Psychology and with the assistance of the Department of Educational Research, Ontario College of Education, a study to test the effect on learning ability of the daily addition of 2 mgs. of thiamine was carried out in a large children's home. The 75 children whose ages ranged from 5 to 16 years were given a carefully chosen series of psychometric and learning tests. After six weeks of therapy the tests were repeated. The results are now being assembled.

The study of the administration of vitamin A to a group of apparently healthy young adults, many of whom exhibited elevations and generalized thickening of the bulbar conjunctiva, has been completed. It was found that the daily administration over a period of two years of 50,000 international units of vitamin A did not render the bulbar conjunctiva more transparent or thinner.

### **PATHOLOGICAL CHEMISTRY**

*Under the direction of Professor A. Hunter*

During the academic year now ended no change has been made in the recently revised content of the departmental courses; but the fifth-year laboratory work conducted by Dr. Urquhart has been given to the whole class at once in ten weekly four-hour periods, instead of, as formerly, in forty one-hour periods to one third only of the class at a time. This has been much more convenient for the teaching staff and is believed to have been of advantage also to the students. The only drawback has been the consequent crowding of the laboratory; but this will be avoided in the revised curriculum, which should go into effect next year.

The various courses, particularly those of the fifth year, have been conducted under the handicap of a still somewhat depleted staff. In the fourth-year laboratory the situation was eased by the voluntary services of Mrs. E. F. Wellington, to whom the Department owes a debt of gratitude. It is hoped that next year Dr. Gornall, now absent on war service, will have returned to academic duty.

The number of students enrolled in the Department was 277, of whom 135 were fourth-year and 135 fifth-year medical students. There were six graduate students registered, and one candidate for the degree of B. Sc. Med. Of the graduate students two were Ph.D. candidates (one majoring in Pathological Chemistry), and two M.A. candidates. Both of the M.A. candidates graduated in June.

The Department has continued to perform basal metabolic rate determinations for certain services of the Toronto General Hospital. The total number of such determinations was 136. The number of patients involved was 103, of whom 89 were surgical and 14 obstetrical or gynaecological.



**PATHOLOGY AND BACTERIOLOGY**

*Under the direction of Professor William Boyd*

The Department has been handicapped not only by the absence of members of the staff overseas, but also by a shortage of fellows and interns. For this reason it has not been possible to do much more than the routine work of the Department in the divisions of surgical pathology and autopsies. Surg. Lieut. R. L. MacMillan and Surg. Lieut. I. B. Macdonald have been sent to the Department by the Navy for training in pathology and bacteriology.

In the division of Bacteriology the opening of the penicillin production plant in old Knox College permitted the closing down of the pilot plant operated under the supervision of Dr. P. H. Greey. Over 300 patients were treated with the penicillin prepared in this department in collaboration with the biochemical group of the Banting and Best Department of Medical Research. Studies on penicillin and other antibacterial substances are being continued through grants from the National Research Council. Following a request made to the National Research Council by the Director General of Medical Services (Army) Dr. Greey was asked to undertake an investigation on the problem of *Proteus* infection in the urinary tract of patients with paraplegia. A survey of the bacterial flora present in such patients was completed and the sensitivity to penicillin and streptomycin of the micro-organisms isolated was determined. The results of this study were so promising that the work has been carried forward into the clinical field. The clinical investigation has been done at Christie Street Hospital in association with Dr. Carl Aberhart of the Department of Surgery. Through a combination of streptomycin and penicillin therapy it was found in the few cases so far treated that the infecting micro-organisms could be eliminated from the urinary tract. This permitted the removal of the suprapubic tube, which in a number of the paraplegia cases had been in place for two years or more. The suprapubic wounds healed rapidly, the urine changed from an alkaline to an acid reaction and in suitable cases bladder control was regained. The results of this form of therapy are encouraging but it will require a longer time of observation and a larger series before any final conclusion can be drawn. The streptomycin used in this study was supplied by Merck & Co.

Also in co-operation with Dr. Aberhart and supported by the National Research Council, a study on the thermal-death time and sulphonamide-resistance of gonococci was completed. Since the strains used were isolated prior to the general distribution of penicillin, their sensitivity to this drug is being determined in order to ascertain the natural variations for the gonococcus in this regard. Now that penicillin is being widely used for the treatment of gonorrhoea another collection of strains of gonococci will be made. Comparison of the penicillin-sensitivity results in the two series may detect the development of acquired drug-resistance by this micro-organism similar to that which occurred during the use of the sulphonamide drugs.

Prophylactic vaccination against tuberculosis with BCG (*Bacillus of Calmette and Guérin*) was undertaken by Dr. R. M. Price. The vaccine was supplied through the courtesy of Professor A. Frappier, University of Montreal. The administration included oral, cutaneous and puncture methods. A group of twenty-eight volunteer students not reacting to the tuberculin test was used. No untoward results have been noted after twelve months. Approximately 50 per cent of the group have become positive to tuberculin. This work is being carried further with a larger group of about eighty.

The clinical and laboratory studies of selected cases of tuberculosis in children, chiefly surgical lesions and meningitis, are being continued. Again no bovine infection has been found in the Ontario group of children. However, one fatal case of meningitis suspected as being of bovine origin in a child recently arrived from Scotland is being investigated.



In the division of Neuropathology Dr. E. A. Linell was appointed Consultant in Neuropathology to the Department of Veterans' Affairs at Christie Street Hospital in August, 1944.

Dr. Linell has co-operated with Major J. E. Bateman and Dr. K. G. McKenzie in an experimental investigation of a new method of repair of peripheral nerves by plasma suture. A report on the progress of this work was given before the Neurology and Psychiatry Section of the Academy of Medicine in January, 1945. The investigation is proceeding.

The postgraduate instruction given to graduates taking the diploma in Psychiatric Medicine has again been expanded to include fifteen service personnel, ten R.C.A.M.C. and five R.C.A.F. officers having joined the course during the year.

Lieutenant-Colonel Desmond Magner has been on leave of absence overseas since January, 1940. During the present year he published a paper in conjunction with Lieutenant-Colonel E. H. Botterell in *The Lancet* on "Meningitis due to Ps. pyocyanea penetrating wounds of the head."

The following officers have been seconded from the armed forces during the past two years for training in the Department: Captain W. S. Hartroft, Captain J. O. Patten, Captain P. S. Rutherford, Captain A. S. Lewis, Surgeon Lieutenant I. B. Macdonald.

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#### PHARMACOLOGY

*Under the direction of Professor V. E. Henderson*

We consider the teaching in this Department this year has been more successful than for several years past. Though we were short of teachers, all three of us were experienced, as Dr. Ferguson was able to be present for almost all



classes. Though we only covered two thirds of the course, the students worked extremely well and the close personal contact with experienced teachers led to very satisfactory results.

The lack of adequate assistants, both technical and medical, has led to less research being carried out than usual. Dr. Lucas, in conjunction with Dr. Ham, carried on his studies of certain explosives and various reports were prepared for the National Research Council.

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#### PHYSIOLOGY

*Under the direction of Professor C. H. Best*

The Department has made increasing use of motion pictures in teaching. Approximately 50,000 feet of film were run for the various classes. Some of these pictures have been prepared in the Department and others have been purchased. It is planned that eventually the Department will have films available which will serve as an introduction to each laboratory experiment. The students are able to see every detail of the film presentations, which is certainly not true in actual demonstrations.

Researches in Professor N. B. Taylor's section on the production of isinglass as a blood substitute in haemorrhage and shock have been completed. This material, which is being manufactured by the Connaught Laboratories, is available in limited quantities until the next fishing season commences, when unlimited quantities of sounds can be secured.

Dr. Taylor has spent most of his time during the past year in the preparation of the fourth edition of *The Physiological Basis of Medical Practice* and in the revision of Stedman's *Medical Dictionary*.

Dr. R. E. Haist and his group have continued studies on experimental secondary shock. Mrs. J. I. Collins-Williams has compared the efficacy of different infusion media and has studied the effect on shocked animals of oxygen under pressure. The effect of fructose and of insulin on liver glycogen storage and the changes in muscle glycogen in shocked animals were investigated. Dr. M. A. Ashworth compared the effect of application of plaster casts to injured extremities with the effect of reclamping, and is carrying out cross-transfusion experiments concerned with the etiology of shock. Mrs. E. J. M. Pugh found that the haemoconcentration in shocked rats is reversed by reclamping. She is investigating the changes in carbohydrate tolerance in shocked animals in relation to islet function.

Dr. L. B. Jaques and his group have continued their studies on heparin and blood clotting, and the John and Mary R. Markle Foundation has made a further grant in support of this work. With Miss A. G. Macdonald, a study has been made of factors affecting the inactivation of heparin in the body. Miss H. J. Bell has completed her study of the reducing groups of fibrin. Important observations on the changes in blood prothrombin have been made by Miss A. P. Dunlop. She has shown that the prothrombin time in animals after administration of dicumarol is very sensitive to changes in calcium concentration, and also that it is reduced transiently by phthalic acid.



Dr. E. Fidler has conducted experiments in collaboration with Dr. Jaques on the influence of silicone surfaces on the clotting system.

Dr. G. A. Wrenshall has improved the technique for insulin assay and has studied the effect of choline on the insulin content of pancreas in dogs and rats. In general, choline has a favourable effect on the retention of insulin in pancreas under various dietary conditions. Dr. Wrenshall has also given valuable aid in the studies in which tracer elements are required.

The Medical Research Division of the Royal Canadian Navy has continued the investigations in the Department of Physiology and has made use of the facilities generously provided by the University for this purpose. Surgeon Commander D. Y. Solandt and his associates have continued their studies on vision and the conditions governing the most effective use of the eyes. Surgeon Lieutenant Commander J. W. Scott and Surgeon Commander Solandt have studied the relation of colour vision to dark adaptation and to night vision. The results are of interest to the naval service. It is indicated, in part, that when stimulated by point sources of coloured light of low intensities, just above the threshold for stimulation, the cones give an achromatic response. At higher intensities the cones give the chromatic response. These investigators have also evaluated the usefulness of the "Ortho-Rater" which is an instrument designed to assess rapidly visual function when large numbers of individuals must be tested.

The problem of producing goggles which will permit the observation of tracer bullets against or near the ball of the sun has received much attention. Surgeon Commander Solandt and Lieutenant (SB) M. L. Bunker have determined the properties required in the light filters by spectrometric methods and have worked intensively towards solving the many practical problems involved in the project.

The Medical Research Division has developed methods and equipment for the testing of special senses of the personnel of the Royal Canadian Navy. The recommendations arising from this work have been adopted and a large number of naval personnel have been tested by these standardized and reproducible methods. Surgeon Lieutenant Commander C. G. Smith has reported on many important findings which have been revealed by this work on naval personnel.

The investigations on the perception and analysis of sounds have been continued by Dr. Ruth C. Partridge, Dr. Jean P. Fletcher and Mr. J. E. Goodwin. Many observations have been made which are of importance from the purely scientific as well as from the practical point of view. Some of the practical recommendations have been put to use in anti-submarine warfare. At present, the physiological mechanisms governing fatigue are being investigated in greater detail through the use of the electroencephalograph.

Surveys have been made of nutritional conditions in H.M.C. Ships and Establishments and the results have been compared to those obtained in earlier studies. Although naval laboratories were used chiefly in this work, the aid of the University laboratory was essential. The surveys, which were quite comprehensive, included determinations of the nutritive values of the foods served and the assessment of the nutritional status of the personnel. Lieutenant Commander (SB) J. Campbell, Surgeon Lieutenant J. G. Watt and Nursing Sister (Tech.) E. J. Reed co-operated in the investigations. Various recommendations arising from this and other work have been put into effect. The Canadian Dental Corps took part in certain aspects of these studies.

Surgeon Lieutenant Commander Scott and Surgeon Lieutenant W. Locke have completed an investigation on the sterilization of air by ultra-violet light. Equipment for the purpose was built and was tested, in co-operation with Dr. Beverley Hannah and Squadron Leader J. Mather, R.C.A.F., at the Riverdale Isolation Hospital, with promising results.

Noise levels in various types of H.M.C. Ships have been investigated by Lieutenant Bunker, and measures designed to protect and to increase the efficiency of the personnel exposed to high noise levels have been recommended.



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*The Role of the Department of Physiology of the University of Toronto in  
World War II*

(September 1939—August 1945)

In the years between the two world wars Canada's investment in scientific research was, when estimated on a per capita basis, pathetically small and this deficiency was shared by the medical sciences. As a result the country entered the Second World War with only a handful of workers fully trained in research methods in the medical and allied fields. It was therefore necessary to utilize all the facilities available in the solution of war problems. To this end the Director of the Department obtained permission from the President and the Board of Governors to divert departmental research funds for the prosecution of war research in the Department's laboratories. Furthermore, all requests for specially trained research workers required to undertake war research in the services or other departments of government, were met and the gaps left in the teaching staff were filled by enlisting the aid of a number of married women with previous post-graduate training in physiology and by making extra demands, always fully met, on the remaining faculty members in the Department.

It became evident very early in the struggle that groups responsible for war researches must also be able to demonstrate the practical application of their findings.

Service personnel have too often considered the hazards, discomforts and inefficiencies of their calling as a necessary part of their occupation. Furthermore, engineers in charge of the design and manufacture of fighting equipment have not recognized the implications of the fact that all pieces of ordnance have to be operated by human beings and that these human beings have certain very definite physiological limitations. During the early phases of the war the idea of including a physiologist in every group designing equipment was not welcomed by the authorities. In time, however, it became clearly evident that the complex characteristics of the human machine required particular consideration and the idea was, in many cases, adopted with gratifying results. During the latter years of the conflict the country could have used many more medical research workers than were actually available.

To ensure efficient utilization of the research staff available, all the research projects being actively pursued in the Department in the first few weeks of the war were reviewed. Steps were taken to terminate, at the earliest possible moment, all those not contributing to the war effort.

In the autumn of 1939 work was begun on the prevention and treatment of wound shock. Many aspects of traumatic and burn shock in experimental animals were studied. Early investigations by Drs. Best, D. Y. Solandt, J. M. Magladery,



and Lieutenant Commander C. R. Cowan demonstrated that the shock following muscle damage to the hind limb of a dog could not be entirely attributed to the fluid loss from the circulatory system into the injured tissues. Exchange transfusion experiments gave some indication of a circulating toxin and the work of Drs. Jean Manery, J. Campbell and D. Y. Solandt indicated that this deleterious material was not potassium. The exchange transfusion pump developed in the Department and built in its shop, has proven a useful aid in the study of traumatic shock both in the local laboratories and elsewhere. Dr. R. E. Haist and his collaborators, using a number of original techniques, demonstrated a bizarre form of shock following the stasis of blood in the hind limbs of albino rats. This type of shock was found to be readily controllable and in many ways to constitute an ideal phenomenon on which to test therapeutic procedures.

Special efforts were made to evaluate the methods which might be used for the treatment of such shock in human subjects. Experimental work on the relative efficacies of intravenous saline, transfusion of whole blood, blood serum and blood plasma, were undertaken by workers in the Department of Physiology. These investigators, in company with other workers, were able to demonstrate the value of transfusion with human blood serum and blood plasma in the treatment of experimental traumatic shock. While the fundamental work on shock in experimental animals was continued by various groups within the Department right up to the end of the war, the first practical finding, i.e., that the replacement of fluid loss in the circulatory system was the most important single step in the treatment of the condition, was early applied in the treatment of shock in war casualties. To facilitate such treatment and as a logical outcome of the experimental work on wound and burn shock, the Head of the Department organized the first civilian blood donor clinic in Canada for the purpose of supplying blood to the armed forces. This clinic was established in the old Grace Hospital in Toronto. The initial expenses were defrayed by University of Toronto funds but subsequently, i.e., within a few months, the project received substantial aid from the Canadian Red Cross Society.

The difficulties experienced in the prolonged storage of whole blood were well known and with this in mind, and on the advice of British workers in the field, a pilot plant was established for the production of dried human blood serum. This material was dried from the frozen state using pooled human blood serum containing material from all blood types which resulted in a single transfusion product which could be given safely to any individual. The blood serum was dried in the bottle in which it was shipped and in which it could be reconstituted by the addition of sterile water just prior to its use. It is gratifying that some of this early material, shipped to the British Isles by bomber, was available for treatment of civilian victims of air attack in the Battle of Britain. In all the early work on the etiology of traumatic shock and on the preparation of human blood serum for treating this condition, Dr. William Thalhimer of the Manhattan Serum Laboratory, New York City, gave invaluable assistance and advice.

When the Canadian government decided to produce dried blood serum in large quantities they paid tribute to the pioneer work of the Department of Physiology in this field. The Canada-wide collection of blood was placed in the hands of the Canadian Red Cross Society and the pooling, drying, packaging and testing of the product was entrusted to the Connaught Laboratories of the University of Toronto and, later, also to the University of Montreal. The entire drying project was henceforth financed and controlled by the federal government. Personnel of the Department of Physiology acted in an advisory capacity to the Red Cross Society and supervised the planning and installation of the first blood serum drying and packaging plant at the Connaught Laboratories Farm. In approximately three years of large-scale operation nearly 2,000,000 donations of blood were received. The



serum was prepared, dried and packaged and much of it was sent overseas. Although the initial investigative work in this field was performed by members of the Department of Physiology, much of the actual study was carried out in the Department of Physiological Hygiene and it was through this latter Department that liaison with the Connaught Laboratories was effected.

Dr. E. T. Waters, with Dr. N. B. Taylor and his collaborators, became interested in isinglass or fish gelatin solution (relatively free from pyrogenic substances) which could be used intravenously as a blood substitute in the treatment of shock. Dr. Taylor proceeded with the preparation of this material which was given clinical trial with encouraging results.

Several lines of research which had been initiated in the years before World War II were continued because it was felt that the findings which might result from such work would probably be of use to a nation at war. Studies on the etiology and prevention of diabetes mellitus by Drs. Best, Haist, and A. Ham, of the Department of Anatomy, were continued for a short time. The investigation of the blood clotting processes and their modification with heparin by Dr. L. B. Jaques and associates was maintained throughout the war. Earlier work in this field had led to marked advances in the field of vascular surgery and certain of the findings had obvious practical applications. Aided by the National Foundation for Infantile Paralysis of New York, Dr. Solandt, and Dr. D. B. DeLury of the Department of Mathematics, with assistance from Drs. Magladery and John Hunter and other members of the Department of Physiology, have studied the basic physiological processes in skeletal muscle deprived of its motor nerve supply. This work was instituted in Toronto following the serious poliomyelitis epidemic in Ontario during the autumn of 1938. On the outbreak of war the National Foundation far-sightedly approved continuation of support for the Toronto work even if this should henceforth concern itself chiefly with traumatic denervation and other conditions related to modern warfare. This field of study has yielded not only new facts related to function in this tissue but has given the clinician aids to the diagnosis and treatment of denervated skeletal muscle. This work is to be continued and related not only to clinical investigation in hospitals of the Department of Veterans' Affairs, but also to the earlier studies of time factors in excitable tissues, a subject in which personnel of the section of Biophysics have done pioneer work.

Departmental work for the services was begun early in the war. At the suggestion of Professor A. V. Hill—then British Air Attaché in Washington—and through the efforts of the Head of the Department, the biophysical section, under Dr. Solandt, undertook experiments on aeroplane cockpit illumination. Lighting had to be provided which would permit the efficient operation of the aircraft and also facilitate the retention of night vision in the flying personnel. The system had to be applicable to night-fighter aircraft on interception duty in the Battle of Britain. This problem was solved effectively and following favourable reports on test flights made in December of 1940, the system has been slowly adopted for certain night-flying aircraft by the Canadian, British and United States services. In a modified form this "low intensity red illumination" is now in extensive use in the ships of the navies of the United Nations.

Shortly after the outbreak of the war Dr. Best and Dr. Solandt enlisted in the Army and took the Army basic training. Early in 1941 the Head of the Department became interested in the physiological problems involved in naval operations. Such problems are always encountered when personnel are required to operate specialized equipment under unusual conditions and in unaccustomed environments. The National Research Council authorized the formation of a Subcommittee on Naval Medical Research of the Associate Committee on Medical Research. Professor Best was elected Chairman of this Subcommittee and shortly after its incep-



tion both Dr. Best and Dr. Solandt were released from the Army in order that they might volunteer for service in the Royal Canadian Navy. With the financial support of the National Research Council and the full co-operation obtained from fellow officers in the naval service, research along a number of lines soon became productive. Dietary investigations under Dr. James Campbell proved necessary and rewarding as did also the study of specially prepared food and water for use aboard life-rafts and life-boats. New tests for the special senses were devised with the requirements of the naval service in mind. The Royal Canadian Navy Colour Vision Test Lantern and the Royal Canadian Navy Visual Acuity Test Apparatus were both designed and built in the Department of Physiology. These devices have been tested and approved by other services in Canada, Britain and the United States. Following investigative work on the phenomenon of night vision, special tests and test apparatus were set up to evaluate this function. Facilities for the large-scale testing of naval personnel were installed at Halifax and operated by Dr. Carl Smith of the Department of Anatomy, University of Toronto. The special auditory functions required by submarine detector operators were investigated and tests were devised for evaluating these functions in terms of naval requirements. Much of the equipment for these tests was built in the Department of Physiology shop by K. Roseblade, J. Brown and F. L. Robinson. Drs. Ruth C. Partridge, Jean P. Fletcher and H. D. Hebb undertook research into the unusual type of auditory fatigue experienced by submarine detector operators and obtained results of the greatest practical importance.

Dr. John Scott did useful work in surveying the lighting and ventilation of naval shore and ship establishments and with Dr. William Locke completed interesting experiments on the effect of electrical ultra-violet light air sterilization on airborne bacteria. For this latter work a unique air re-circulation and sterilization device, built in the University shops, was employed. Dr. Solandt and Mr. M. L. Bunker carried to a satisfactory practical conclusion surveys of noise and carbon monoxide hazards aboard naval vessels and incorporated their findings in recommendations for the improvement of working conditions afloat in the Royal Canadian Navy. With the Head of the Department they also developed, in the final months of the war, a type of goggle which proved to be the most useful yet devised for the specialized purpose of permitting anti-aircraft gun crew personnel to follow tracer bullets under conditions of extreme glare. After extensive experiments on "immersion foot," artificially produced in albino rats, this group of workers developed a vaseline-impregnated sock which proved effective in preventing the condition in experimental animals. With the assistance of the Navy League of Canada, five thousand pairs of specially prepared and packaged socks were placed aboard ships of the Canadian Merchant Marine. It was felt that, following the torpedoing of merchant vessels, the use of these socks would determine whether this prophylactic measure was as effective in man as in experimental animals. The submarine menace had abated, however, by the time the socks were available in the ships so that the method is still untried as applied to man. Dr. Solandt and Mr. Roseblade developed a "dichroic anomalscope," a device designed to test colour vision and to give an evaluation of colour vision on a continuous scale rather than from the discontinuous type of grouping yielded by the existing types of colour vision tests. Such a test would have use in the services or industries where a more careful grading of colour vision function than could be obtained by tests currently used would be of value.

The evaluation, dissemination and correlation of research information and the interpretation of this information by experts to personnel in the service or services concerned, is one of the most important scientific tasks in war-time. This is largely controlled and to some extent accomplished by committees. The most important



medical committees in Canada have been those authorized by the National Research Council. As mentioned previously, the Head of the Department has been Chairman of the committee directing naval medical research since its inception. He has also been an active member of the Associate Committees on Army Medical Research, Aviation Medical Research, and (General) Medical Research. He is also a member of the Co-ordinating Committee on Medical Research. A number of subcommittees operate under these parent committees, and of these Dr. Best is Chairman of the Subcommittee on Shock and Blood Substitutes and Dr. Haist is Secretary of the Toronto section of this body. When the blood donor service was handed over to the Red Cross a National Committee to handle this work was set up and Dr. Best was placed on this Committee of which Dr. Solandt was also made a member.

Dr. Solandt is Chairman of the Subcommittee on Industrial Hygiene and Industrial Medicine, Secretary of the Associate Committee on Naval Medical Research, member of the Industrial Hygiene Advisory Committee of the Department of National Health, and member of the Industrial Health Committee of the Canadian Medical Association.

Dr. Best was a Scientific Director of the International Health Division of the Rockefeller Foundation for three years of the war and in that capacity was brought into close touch with many problems of international importance.

In the autumn and winter of 1941 and 1942, Drs. Best and Solandt visited Newfoundland, Iceland and the British Isles. Dr. Best's membership in a wide variety of committees made this visit especially valuable from the standpoint of research liaison alone. Dr. Best visited the United Kingdom again in 1943 as a representative of the Royal Canadian Navy, the National Research Council of Canada, and the Rockefeller Foundation.

Shortly after the outbreak of World War II it became apparent that Canada was suffering a real shortage of medical practitioners as well as of trained research personnel. Thus, teaching at an accelerated tempo became one of the important war-time activities of the Department of Physiology. Dr. N. B. Taylor and, to a much smaller extent, Dr. Best, were forced to devote valuable time to the revision of the authorized text, *The Physiological Basis of Medical Practice*, which is considered a valuable tool in the departmental teaching programme. Dr. Haist undertook a revision of the laboratory course as given to the medical students, and in this connection new mimeographed sheets were provided and much new apparatus was built by Messrs. Robinson and Brown to permit the students to carry out experiments which had previously been given as class demonstrations.

Special mention should be made of the members of the Department who made outstanding contributions to the services overseas.

After considerable experience in service research in England with the R.C.A.M.C. and in Africa with the Eighth Army, Lieutenant Colonel A. L. Chute was placed in charge of the First Canadian Field Medical Research Unit and saw service in the Italian and European theatres. Major J. M. Magladery undertook similar work for the Canadian and British Armies in England, Africa and other theatres. Colonel E. H. Botterell served with the First Canadian Neurological Unit and took charge of the surgical department of this organization in England.

Dr. E. T. Waters enlisted in the Royal Canadian Air Force and did valuable research work on service problems in that organization; during the course of these duties he was severely injured in an aeroplane accident in the Aleutian Islands. Dr. Jacob Markowitz served with the Royal Army Medical Corps, first as a regimental Medical Officer and later in the Malay States as a surgical specialist. While on this latter assignment he was captured by the Japanese army and placed in sole medical charge of some seven thousand fellow prisoners.

The war-time activities of the Department of Physiology have thus been four-



fold. First, there was the provision of specially trained personnel to the armed services and other agencies of government requiring help in scientific matters. The second item was the prosecution of research projects of war-time importance within the laboratories of the Department itself. The third embraced the various services of departmental personnel on committees dealing with war research. The fourth and final category on the list was the continuation of the Department's teaching activities essential to supplying, in increasing numbers, medical practitioners, dentists, teachers and the medical research personnel of the future.

### PSYCHIATRY

*Under the direction of Professor C. B. Farrar*

The teaching programme was essentially unchanged except for the fact that the elective course was omitted. This was on the basis of a ruling that the course would not be given if less than six fifth-year students, whose grades would entitle them, applied for the course. There were about a dozen applications but only four from students who were eligible.

The graduate course leading to the diploma in Psychiatry has been continued although again on a reduced basis. Three medical officers began the course but one was obliged to discontinue in mid-year by reason of transfer to the staff of the Ontario Hospital, London. The two physicians who are completing the course are Dr. L. D. Carpenter and Dr. M. Fischer. This course runs for a calendar year and will not be completed until September. The candidates will take their examinations in that month.

Short courses for men in the armed forces have continued but on a reduced scale. At the present time two medical officers from the Air Force are enrolled. The total numbers of men to date who have been detailed to this centre for instruction are thirty-four from the Army, twelve from the Air Force and two from the Navy.

The death of Dr. B. T. McGhie, Demonstrator, reduced the number of demonstrators actively on duty to three, three being on leave of absence. It was recommended that Dr. J. G. Dewan be transferred from the rank of research fellow to that of demonstrator.

The Rockefeller grant jointly to the Department of Psychiatry and the Banting and Best Department of Medical Research for psychiatric investigation terminates June 30, 1945. Arrangements are being made for continuing the more essential parts of this work with the assistance of the Banting Foundation and an additional service contribution by the provincial Department of Health.

During the academic session 1944-45 observation has continued in the research unit on the relation between the degree of mental illness in schizophrenic patients, and the abnormalities in carbohydrate metabolism. The series of patients on whom oral and intravenous glucose tolerance observations have been made has now increased to a significant group and it is possible to confirm the suggestions reported in previous years and to conclude that the improvement in glucose tolerance which coincides with clinical improvement in the schizophrenic is of prognostic value. The series on whom pyruvate tolerance observations have been made is still too small for final evaluation and we hope it will be possible to continue this investigation.

The group of bilateral frontal leucotomies, performed by Dr. K. G. McKenzie of the Department of Surgery, University of Toronto, has increased to include 21 patients and we are favourably impressed with the value of this neuro-surgical therapeutic procedure in the treatment of our chronically mentally ill patients. Observations are continuing on the electroencephalographic investigation



of schizophrenic patients throughout the various phases of their illness, in the hope that some characteristic abnormalities will present themselves in the electroencephalograms which will allow for a better definition of this poorly defined group of mentally ill patients.

Observations have been carried out on the effect of thiamine chloride and cortin on the glucose tolerance of schizophrenics both during the acute and recovered stages of this illness but the series of observations is as yet not large enough for scientific assessment.

The routine psychometric testing programme has been continued throughout the past year. This consists of administering a battery of tests pre- and post-insulin, and another periodical battery during the course of treatment. Although these batteries are quite comprehensive already, the Wechsler-Bellevue Scale for the Measurement of Adult Intelligence has been added and is proving very useful. In addition, further data are being collected on the effect of electroshock therapy upon immediate memory.

Another study in the form of a thesis has also been done. This concerns the possible prognostic value of psychometric tests in schizophrenia.

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#### RADIOLOGY

*Under the direction of Professor G. E. Richards*

There has been no change in the work of undergraduate teaching during the year and no changes in staff have occurred.

The training of Radiologists for the Army and Air Force continued, two classes having been conducted during the year, in addition to which four classes for non-medical technicians were provided. This represents the training of sixteen Radiologists and seventy-three non-medical technicians.

The Department has participated in discussions during the year looking toward the revision of the teaching programme. It is hoped that some improvement can be effected as the present arrangements are very unsatisfactory and do not permit the best contribution which this Department can make to undergraduate teaching.

#### SURGERY

*Under the direction of Professor W. E. Gallie*

The preparation of the annual report of 1944-45 naturally stirs thoughts in retrospect of the contributions made by the Department during the war. The five

<sup>1</sup>On active service.

<sup>2</sup>Not a member of Dept. of Psychiatry staff.



years have gone by, with the accelerated curriculum, the marked increase in the number of students and the constant depletion of the staff, and yet it is possible to say that all students have been given a fair introduction to the fundamentals of Surgery. It is unfortunate that with the close of the war we cannot abruptly terminate the acceleration of the course for all years, and that we still have to face several years of enormous classes on the wards. The return of our staff from overseas, however, will relieve the strain to some extent and allow us gradually to return to normal. A brief review of their service is here recorded.

*Brigadier J. A. MacFarlane, O.B.E., B.A., Sask., M.B., F.R.C.S. Edin., F.R.C.S. England (honoris causa)*, went overseas in 1939 with rank of Lt.-Colonel, as officer in charge of surgery No. 15 Canadian General Hospital. Appointed Consultant in Surgery to the D.G.M.S. in 1941 with rank of Colonel, and later, Brigadier. Served on all fronts; was brought home on a brief leave as guest of the American Orthopaedic Association; appointed O.B.E. January 1, 1945; awarded Honorary Fellowship in the Royal College of Surgeons of England in 1943; has published numerous papers during the war and presented many memoranda upon which surgical policy was based. Stimulated clinical research among young surgical specialists. Did much to further the educational programme in this School by sending officers to us for special surgical training and placing them in suitable appointments upon their return to the Army. Upheld with distinction the honour of Canada and the University in the councils of the surgical consultants of the Allies.

*Colonel R. I. Harris, M.C. and Bar, M.B., F.R.C.S.(C)*. Joined Medical Headquarters Staff at Ottawa in March, 1943, with rank of Lt.-Colonel, as Consultant in Surgery to the D.G.M.S. on a part-time basis. Promoted Colonel in 1944. Gave increasing amounts of time to the service until during the last two years of the war he was home only occasionally. Gave distinguished service in the Army across Canada. As Chairman of the Committee on Orthopaedic Surgery, National Research Council, stimulated studies of value to the Army. Conducted extensive clinical research on "The Soldier's Foot" and published numerous papers and memoranda on military surgery. Did work of the utmost value in the establishment of the special treatment units for the four Medical Services across Canada.

*A. B. LeMesurier, M. B.* Organized and took overseas in December, 1941, a Red Cross Canadian Orthopaedic Unit which was established under the Emergency Medical Service in Hairmyres, just outside of Glasgow. This Unit has continued ever since to give excellent service and assistance to the E.M.S. Since his return has served on the Orthopaedic Surgery Committee, National Research Council and has written a brochure on "Amputation" for the use of the Medical Services.

*Lt.-Colonel E. H. Botterell, O.B.E., M.D. Man., F.R.C.S. (C)*. Enlisted January, 1940, and went overseas with No. 1 Neurological Hospital in May, 1940. Promoted Lt.-Colonel, November, 1941, in charge of neurosurgery in No. 1 Neurological and Plastic Surgery Hospital. Appointed O.B.E., January, 1945. Recalled to Canada in December, 1944, to organize the Joint Medical Services Neurological Unit at Christie Street Hospital.

*Lt.-Colonel J. W. Brennan, M.D.* Enlisted 1940; Captain, Headquarters M. D. 2, to February, 1942. Promoted Major, July, 1941; Lt.-Colonel, May, 1944. In charge of surgery, Chorley Park Military Hospital to March, 1945.

*Lt.-Colonel S. D. Gordon, M.B., M.S., F.R.C.S. (C)*. Went overseas in 1939 as Lieutenant with No. 15 Canadian General Hospital. Appointed Major in charge of plastic surgery in that unit. Organized and directed, with rank of Lt.-Colonel, the Canadian Plastic Unit at Basingstoke. Brought home in August, 1944, to organize the Plastic Service in the Army in Canada and to act as Advisor in Plastic Surgery to the D.G.M.S. He reorganized the Plastic Service at Christie Street Hospital and still continues to direct it. Published numerous papers on "Plastic Sur-



gery" during the war and has conducted important researches on animals on the grafting of skin and the transplantation of bone.

*Lt.-Colonel F. G. Kergin, M.A. Oxon., M.D., F.R.C.S. Eng.* Enlisted September, 1939, and went overseas with No. 15 Canadian General Hospital. Served with that unit in England and Africa. Promoted Lt.-Colonel December, 1944, in charge of surgery in No. 2 Canadian General Hospital in Normandy and Belgium.

*Lt.-Colonel J. R. F. Mills, M.D., M.S., F.R.C.S. Edin.* Enlisted July, 1940, in No. 2 C.C.S. Promoted Major, February, 1943, in charge of surgery No. 1 Canadian Field Surgical Unit, and served in Sicily and Italy. Promoted Lt.-Colonel October, 1944, in charge of surgery No. 18 Canadian General Hospital and subsequently in No. 22 Canadian General Hospital. Saw service in France, Holland and Germany.

*Lt.-Colonel H. R. C. Norman, M.D., F.R.C.S. Eng.* Enlisted 1941 and served until September, 1943, in Camp Borden Military Hospital and Debert, Nova Scotia. Overseas as officer in charge of surgery No. 11 Canadian General Hospital in England and, as Lt.-Colonel, in charge of surgery No. 21 Canadian General Hospital in France.

*Lt.-Colonel J. W. Ross, O.B.E., M.D., M.S. Minn.* Joined R.C.A.M.C. in December, 1940, with rank of Major. In 1941 promoted Lt.-Colonel in charge of surgery at Camp Borden. Received O.B.E., June, 1944. In February, 1945, placed in charge of surgery at Chorley Park and there has continued to give the invaluable service that has distinguished him throughout the war.

*Lt.-Colonel T. R. Sarjeant, B.A., M.B., F.R.C.S. Eng. and (C).* Enlisted September, 1939, and went overseas with No. 15 Canadian General Hospital. Served with it in England and Africa. Promoted Lt.-Colonel, October, 1943, in charge of surgery, No. 5 Canadian General Hospital in Italy and subsequently in No. 24 Canadian General Hospital in England.

*Lt.-Colonel R. M. Wansbrough, M.B.* Enlisted September, 1939, as Captain. Went overseas with No. 15 Canadian General Hospital. Promoted Lt.-Colonel in charge of surgery in that Hospital and continued in that post till recalled by the University and the Hospital for Sick Children in April, 1942.

*Lt.-Colonel C. H. Watson, M.B., F.R.C.S. Edin.* Enlisted January, 1940, and served as Major on surgical staff of Toronto Military Hospital and Rideau Military Hospital. Went overseas, September, 1943, as Lt.-Colonel in charge of surgery No. 9 Canadian General Hospital. Served in same capacity in No. 2 and No. 22 Canadian General Hospitals. Recalled in September, 1944, for duty at Christie Street.

*Lt.-Colonel A. W. M. White, M.B., B.Sc. (Med.), F.R.C.S. Edin.* Enlisted 1939 and went overseas with No. 15 Canadian General Hospital. Served with that unit in England and Africa. Promoted Lt.-Colonel July, 1943, in charge of surgery until recalled in January, 1944, by the University and the Toronto Western Hospital.

*Major C. Aberhart, M.D., M.S.* Enlisted 1939 and went overseas with No. 15 Canadian General Hospital. Served with this unit as Surgical Specialist in Urology in England and Africa until invalided home in October, 1943.

*Major W. S. Keith, M.B.E., B.A., M.B.* Enlisted May, 1942. Served with No. 1 Canadian General Hospital in England and with No. 1 Canadian Neurological Hospital, Basingstoke. Promoted Major January, 1943, in charge of surgery, No. 1 Canadian Mobile Neurosurgical Unit and saw service in France, Belgium and Holland. Mentioned in Despatches, March, 1945, and appointed M.B.E., 1945.

*Major F. B. Plewes, B.A., M.D., M.S., F.R.C.S. Edin., F.R.C.S. (C).* Enlisted April, 1942, served as Captain at Camp Borden Military Hospital for one and a half years, then joined No. 12 Canadian General Hospital as Major and



went overseas in September, 1943. Served with this unit in England, Normandy and Belgium.

*Major H. F. Robertson, M.B., B.Sc. (Med), F.R.C.S. (C).* Enlisted 1943 and has served on the surgical staff at Chorley Park Military Hospital.

*Major E. E. Shouldice, M.B.* A veteran of the last war, enlisted in January, 1940, and served in Toronto on military boards throughout the war. He was promoted Major in January, 1943.

*F. R. Wilkinson, M.D.* Went overseas in December, 1941, with the Canadian Orthopaedic Unit which was organized by the Canadian Red Cross to assist the Emergency Medical Service in Scotland. Upon Dr. LeMesurier's return to Canada, Dr. Wilkinson continued as Chief Surgeon to the Unit till his return to Canada in 1943.

*Surgeon Commander W. Keith Welsh, M.B., F.R.C.S. Eng., F.R.C.S.(C).* Enlisted July, 1942. At sea September to November, 1943. In charge of surgery, Royal Canadian Naval Hospital, Halifax, and in charge Special Treatment Centre, Camp Hill Hospital, Halifax. Promoted Surgeon Lieut. Commander, December, 1942, and Surgeon Commander, December, 1943.

*Surgeon Lieut. Commander D. R. Mitchell, B.A., M.B., M.S., F.R.C.S. Eng., F.R.C.S.(C).* Enlisted May, 1942. Served at sea and subsequently promoted Surgeon Lieut. Commander, as Consultant in Urology at Halifax.

*Wing Commander A. W. Farmer, M.B.E., M.D.* Enlisted 1942 as Squadron Leader. Promoted Wing Commander October, 1943, and served at Air Force Headquarters as Chief Surgical Consultant to the R.C.A.F. Appointed M.B.E. January 1, 1946.

*Wing Commander R. C. Laird, B.A. Qu., M.D., M.S., F.R.C.S. Eng., F.R.C.S. (C).* Enlisted 1943 as Squadron Leader and appointed Consultant in Surgery to No. 1 Training Command, R.C.A.F. Promoted Wing Commander December, 1944, and served both as Consultant to No. 1 Training Command and as surgeon at Christie Street.

*Squadron Leader Stuart A. Thomson, M.D.* Enlisted June, 1943, and served for one year as Consultant in Surgery with Eastern Air Command and one year with No. 2 Training Command, Winnipeg, until recalled by the University and the Hospital for Sick Children in April, 1945.

In addition to these regular members of the staff the following Fellows on leave of absence, and former Fellows, have given distinguished service as surgeons in every field of military operations: Major J. E. Bateman, M.D., Captain W. G. Bigelow, B.A., M.D., Captain G. E. Cooper, M.D., Captain W. R. Dalziel, M.C., B.A., M.D., Major F. P. Dewar, M.D., F.R.C.S. England, Captain N. C. Delarue, B.A., M.D., Squadron Leader J. R. Francis, M.D., Captain G. A. Lane, M.D., P. F. McGoey, M.D., Flight Lieut. E. G. Meyer, M.D., M.S., Major W. T. Mustard, M.B.E., M.D., Captain A. B. C. Powell, M.D., Major H. V. Slemon, M.D., Captain T. C. C. Sodero, B.A., M.D.C.M. Dal., Captain W. D. Stevenson, M.D., F.R.C.S. (C), Squadron Leader F. B. Thomson, B.A., M.D., F.R.C.S. (C), Major E. B. Tovee, M.D., F.R.C.S. Edin., G. E. P. Wilson, M.D.

Former Fellows: Squadron Leader W. S. Anderson, Major Thomas Beath, Major F. M. Greig, Lt. Col. Kent Harrison (R.A.M.C.), Major A. D. McLachlin, Captain C. P. McCormick, Flight Lieut. D. B. MacLaren, Major R. K. Magee, Lt. Col. T. S. Perrett, Major R. B. Robinson, Lt. Col. F. L. Shipp, Major F. H. Wigmore, Colonel H. R. Ziegler (U. S. Army), Lt. Col. G. M. Bastedo, D.S.O., Lt. Col. C. S. Day, Lt. Col. B. W. Stevens.

The following did not all receive their primary training in Surgery here but were sent to us by the Directors General of Medical Services for special training as Surgical Specialists: Capt. R. E. C. Anderson, Capt. John Balfour, Fl/Lt. F. J. Barton, Major J. E. Bateman, Capt. W. G. Bigelow, Surg. Lieut. W. G.



Breckenridge, Surg. Lieut. W. E. Collins, Capt. G. E. Cooper, Capt. N. C. Delarue, Surg. Lt. Commander E. J. Delorme, Major F. P. Dewar, Capt. J. C. Dickison, Surg. Lt. Commander G.P. Fahrni, Squadron Leader J. R. Francis, Surg. Lieut. E. D. Gagnon, Capt. K. C. Greer, Major A. H. Henderson, Major H. A. Lackner, Capt. G. A. Lane, Squadron Leader W. J. C. MacArthur, Surg. Lieut. J. T. McCormack, Surg. Lieut. Ian B. Macdonald, Fl/Lt. C. G. McEachern, Surg. Lt. Commander D. L. MacIntosh, Fl/Lt. D. McIntyre, Fl/Lt. E. G. Meyer, Major W. T. Mustard, Capt. W. E. Ortved, Major T. S. Perrett, Major H. V. Slemon, Capt. W. D. Stevenson, Squadron Leader F. B. Thomson, Major E. B. Tovee, Surg. Lieut. A. E. Trottier, Surg. Lieut. W. B. Wallace, Surg. Lieut. G. R. Walker, Surg. Lieut. G. L. Wilson.

Upon their return to their units these officers were given appointments with appropriate rank which enabled them to give the most valuable service to our troops.

The six-month senior internships and residencies were of special interest to us as they enabled us to carry on, even in a disjointed sort of way, the programme of surgical education for our own students. The arrangement with the Directors General whereby men who had been selected here during their rotation internship period for surgical training, were sent back after two years of service for six months' intensive training, and then placed in surgical units, usually under the supervision of one of our own staff, worked splendidly and was much to the advantage of the Services, the School and the officers. It will greatly reduce the difficulty of completing the training of all these young men when they return to Toronto.

The return of the group of partly trained surgeons for six months of residency in our teaching hospitals, provided a steady succession of thoroughly trained young surgeons, capable of assuming independent responsibility, who ultimately became the officers in charge of surgery in most of our advanced surgical units in Italy and Germany.

With the war in Europe ended and the larger part of the army to be demobilized in the next few months we are confronted with the necessity of providing postgraduate training in surgery for the large group of young men, now overseas, who have completed their rotating internships and who have been accepted as satisfactory candidates for postgraduate training. To do this it has been arranged that each hospital will increase its staff of senior interns and that an intern service will be provided at Christie Street Hospital and at Weston Sanatorium. We shall now revert to the programme of three years or more of training in surgery, disrupted by the war, covering a satisfactory review of applied anatomy, physiology and chemistry, a broad training in general surgery and a six months' period in several specialties. The interns will henceforth be viewed as postgraduate students proceeding to the examination for the diploma of Fellowship in the Royal College of Surgeons and for the Master of Surgery degree. For interns who wish to become specialists in one of the surgical specialties such as urology, orthopaedic surgery, and so on, more prolonged services in these subjects will be arranged after the general surgical training has been completed.

During this year four officers have returned from military service and are again available to the University and hospitals. Lieut. Col. Brennan was demobilized at the request of St. Michael's Hospital and the University. Lieut. Col. Botterell was recalled by the Army for the purpose of organizing the Neurosurgical Unit at Christie Street and when this task had been completed was placed on a part-time basis so that he is available for teaching and hospital duties. Major W. S. Keith was recalled by the Hospital for Sick Children and is now in charge of neurosurgery there and at the Western Hospital. Lieut. Col. Stuart D. Gordon who organized and directed the Canadian Plastic Unit overseas was recalled by the D.G.M.S. for the purpose of organizing a similar unit at Christie Street. He, too, has now been placed on a part-time basis in the Army so that he is available to the General Hospital and the University.



In this year's honours lists have appeared the following names:

Brigadier J. A. MacFarlane, who was awarded the O.B.E., January 1, 1945.

Lt. Colonel E. H. Botterell, who was awarded the O.B.E., January 1, 1945.

Lt. Colonel J. W. Ross, who was awarded the O.B.E., June 8, 1944.

Major W. S. Keith, mentioned in despatches, March, 1945; awarded M.B.E., June, 1945.

Major W. T. Mustard, awarded M.B.E., April 1945.

Major H. V. Slemon, mentioned in despatches, 1944.

Captain W. R. Dalziel, awarded M.C., May, 1944.

Civilian honours were this year awarded to several of the staff. The Head of the Department was made Honorary Fellow of the Association of Surgeons of Great Britain and Ireland. Dr. R. I. Harris was made an honorary member of the British Orthopaedic Association. Dr. E. H. Botterell received honorary membership in the British Neurological Association. These distinctions help to maintain our connection with the old land.

I wish to make special reference to the assistance the staff has received during the past four years from a group of surgeons, some of whom have returned to us from retirement and others who have accepted special war-time appointments in order that the work of the hospitals and the University might be carried on. In the former group are Dr. Wallace Scott, Dr. M. H. V. Cameron and Dr. E. S. Ryerson, who have given invaluable assistance. In the latter are Dr. R. V. B. Shier, Dr. W. O. Stoddart, Dr. Jessie Gray and Dr. Marjorie Davis. The two young ladies have given assistance of the highest order both in the matter of teaching and in the routine operative and clinical work of the hospital.

The Balfour Lecture for 1944-45 was delivered by Dr. B. P. Watson, Professor of Gynaecology and Obstetrics at Columbia University, formerly Professor in this University. His subject was "Puerperal Sepsis". It was pleasant to observe that the passage of the years has not lessened the skill of this superb lecturer.

I regret to report the retirement this year of Dr. R. E. Gaby, both from the University and the General Hospital staff. Dr. Gaby has served these institutions faithfully for over thirty years and is only retiring now because a recent illness has warned him that he must conserve his energies for his private work. A very delightful dinner and presentation were given in his honour at the York Club on June 25.\*

## THERAPEUTICS

*Under the direction of Professor R. F. Farquharson*

During the war the Department of Therapeutics has been concerned with various aspects of the war effort.

(a) *Revision of list of drugs held on scale of issue in Central Medical Stores.* Early in the war this revision was undertaken at the request of the Directors General of Medical Services. The co-operation of interested physicians in various centres across Canada was readily obtained. The list of drugs was radically reduced and completely revised.

(b) *Investigation of shock.* As Chairman of the Toronto Regional Committee on Shock and Blood Substitutes, the Head of the Department played an active part in the general work of this Committee and publication of the National Research Council memorandum on "The Early Recognition and Treatment of Shock." Working under this Committee various preparations used in the treatment of shock were tested at the Toronto General Hospital both for beneficial effect and also to detect any untoward reaction. For a long time samples of lots of serum

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\*Dr. Gaby died suddenly on November 15, 1945.



dried for the Red Cross by the Connaught Laboratories were tested. Among other matters of interest it was found that the incidence of infectious hepatitis following administration of the Canadian dried serum was very low. Clinical trials of the use of isinglass were also undertaken. A thorough study of the factors that influence the rate of flow of intravenous infusions was carried out by Dr. Pugsley. This study was specially concerned with the venoconstrictor factor present in serum and dried plasma. Reports on some of the work have been published.

(c) *Testing of drugs.* Clinical trials of special drugs for use in the armed services have been carried on from time to time in co-operation with the Department of Medicine.

(d) *Clinical use of penicillin.* As Chairman and Representative of the R.C.A.F. on the Joint Services Penicillin Committee, the Head of the Department has been engaged in the study of penicillin therapy in many types of infection, in the testing of early lots of penicillin received by the services with regard to painfulness on injection and any other untoward reactions, and with the use of penicillin in the services in general. Reports of some of the work of the Committee have been published.

The work of the Joint Services Penicillin Committee was carried on by numerous medical officers of the armed services and Department of Veterans' Affairs in various parts of Canada. Dr. Philip Greey, Department of Bacteriology, was an active member of the Central Committee. The Committee was greatly indebted to Drs. Frieda and Donald Fraser of the Department of Hygiene for aiding in the bacteriological investigations. Recently Dr. Frieda Fraser had supervised an extensive study of serum level of penicillin after oral administration.

(e) *Air-borne infections.* Working under a grant from the National Research Council and in association with S/L. J. Mather and F/L. A. McClure, the Head of the Department has taken part in an investigation of air-borne infections. The use of aerosols (propylene glycol) was tested in an R.C.A.F. barracks and found to be impractical although it had some bactericidal action. A report of this work has been published by S/L. Mather and F/L. McClure.

The same group have carried on investigations on the effectiveness of the scarlet fever immunization programme of the R.C.A.F. More recently a study of the serum level of diphtheria and tetanus antitoxin in several hundred R.C.A.F. personnel has been undertaken in co-operation with Professors Donald Fraser and Peter Moloney. Reports of this work will be published.

(f) The Sub-Department of Anaesthesia has given training to numbers of medical officers from the services during the war years.

(g) Dr. W. J. Gardiner, Sub-Department of Physical Therapy, has acted as Consultant in Physical Therapy to the R.C.A.F. with the honorary rank of Wing Commander.

During the year 1944-45 the work of the Department and its two Sub-Departments has been carried on without any gross change in the routine or organization.

Drs. L. Stirrett, Murray Woodside and Allan Douglas acted as Assistants in Therapeutics.

Dr. Herbert Pugsley continued his investigation on the venoconstrictor factor present in serum and dried or old plasma.

## **BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH**

*Under the direction of Professor C. H. Best*

Dr. C. C. Lucas and Dr. Jessie H. Ridout, assisted by Miss M. K. O'Grady and Miss M. J. Murray, have compared the lipotropic effect of choline and inositol in basal diets of varying composition, using young and old rats. Other organs



have been analyzed to see whether these diets have altered their lipid content. The influence of biotin upon these effects has also been investigated.

The effect of the nature and amount of protein in the basal diet upon liver fat and upon the lipotropic effect of various agents is being further investigated by Dr. Lucas and Miss O'Grady. The use in the basal diet of arachin, the main globulin component of peanuts, has been studied. This protein is very low in methionine and has proved eminently suitable as the protein moiety in a basal diet adequate in every respect with the single exception of the lipotropic factors. Because of the commercial unavailability of arachin and the relatively costly and tedious preparative procedures involved in isolating it from peanut meal, the use of defatted peanut flour to supply protein in hypolipotropic diets is also being investigated.

Miss J. M. Lang and Dr. Lucas have been studying the use of micro-organisms for the bioassay of choline, biotin and certain essential amino acids. The suitability of the mould *Neurospora crassa* for the estimation of minute amounts of choline has been confirmed. The possibility of interference due to the presence of certain closely related secondary and tertiary amines and quaternary ammonium bases is being examined.

Dr. C. S. McArthur (who is also part-time assistant in the Department of Pathological Chemistry), with Dr. Lucas, has been studying the mechanism of the lipotropic action of triethyl hydroxyethyl ammonium chloride, sometimes colloquially referred to as "triethyl choline." Several micro methods for estimating minute amounts of choline and its triethyl homologue in the presence of each other have been developed by Dr. McArthur. One is strictly chemical, depending upon the great volatility of trimethylamine at 5°C. as compared with that of triethylamine. Another method involves determining total choline-like substances by the enneaiodide procedure and estimating true choline by using the highly specific microbiological assay method with *Neurospora crassa*.

Dr. McArthur and Dr. Ridout have improved one of the standard micro methods for the estimation of cholesterol, making it more suitable for the type of work in which the Department is interested. Dr. Lucas, Dr. McArthur and Dr. Ridout have developed a routine procedure for the extraction and differential analysis of the total lipids in animal tissues. These procedures are now used routinely in preference to the older method of estimating only total crude fatty acids in tissues.

Dr. McArthur, collaborating with Dr. E. Baer (Department of Chemistry), reported a new and greatly improved synthesis of phosphorylcholine by methods in which no secondary reaction products are formed. The stability of the product to acid, alkali and to true and pseudo cholinesterase was determined.

Dr. S. F. MacDonald has prepared a number of compounds related to choline for use in dietary and metabolic studies. He is also exploring some synthetic methods which might be of use in work on alkaloids, and in this connection previous work on benzoxazolones in this laboratory has been extended. Since March, Mr. A. J. Chechalk, who recently was discharged from the Air Force, has been assisting him in these synthetic studies.

In the Sub-Department of Cellular Physiology, Dr. B. Mendel and his associates, Mrs. R. Hawkins and Mrs. J. Gunter, continued their studies on cholinesterase. In the course of their investigations on the cholinesterase in lower forms of life they found a new type of cholinesterase with a pronounced resistance to eserine and they have been engaged in determining the characteristics of this enzyme. Extensive work has been done on the selective inhibition of the different types of cholinesterase by various synthetic anti-cholinesterases in order to provide a method for estimating separately the activity of each enzyme towards acetylcholine when a mixture of cholinesterases is present.

Mr. J. E. Goodwin and his assistants have collaborated with the R.C.A.F. on some of the problems associated with the use of intercommunication systems in



aircraft. They have also been conducting researches on the physiological factors associated with hearing in a noisy environment.

Mr. Goodwin has continued his electroencephalographic researches in collaboration with the Department of Psychiatry and has collaborated with Dr. Ruth C. Partridge in a study of the central changes associated with auditory fatigue.

Work on aviation medical research has continued on behalf of the R.C.A.F. under the auspices of the National Research Council Associate Committee on Aviation Medical Research. Dr. G. F. M. Smith has succeeded Dr. E. C. Black as Honorary Secretary for the meetings of the Associate Committee and as Secretary of the Subcommittee on Oxygen Equipment. Dr. Black took up an appointment in Dalhousie University in September. Dr. J. A. Kitching has continued as Secretary of the Subcommittee on Protective Clothing, assisted by Miss M. Shaw and Miss E. White. Dr. Pagé assisted in the considerable secretarial work of the Subcommittee on Protective Clothing until his departure for Laval University in September.

Dr. Black and Dr. Smith continued to work on the fit of oxygen masks. They also devoted a considerable amount of time to the preparation and editing of manuals for the use of the R.C.A.F. on oxygen and intercommunication equipment. Dr. Smith has continued his work on the statistical analysis of tests on R.C.A.F. intercommunication equipment. Important fundamental and practical studies in acoustics in connection with hearing in aircraft have been carried out by Miss M. Mounfield and Miss J. Livings, under the direction of Mr. Goodwin.

In the field of protective clothing Dr. A. C. Burton has undertaken much work in connection with the field testing of military equipment. Dr. Pagé and Dr. Kitching have continued with the design of various articles of personal equipment. Mr. J. Crittle and Mr. S. Smith have assisted in the construction of apparatus and in the design of equipment under these various projects. A considerable amount of fundamental work has also been carried out in this field. Dr. Burton has made a theoretical analysis of the heat exchange through the clothing under hot conditions. Dr. Kitching has continued to study the transmission of water vapour through fabrics, in collaboration with workers of the Ontario Research Foundation.

In addition to the development of new articles of equipment, assistance has been given in connection with production and inspection of articles developed in previous years. Work on the production of motion pictures of a documentary and training nature has also been carried out extensively during the past year.

Most of the work on aviation medicine is confidential and cannot be discussed at present.

The clothing section of the Naval Medical Research Division has again conducted trials on various articles of clothing and equipment. This work has been supervised by Surgeon Captain Best and carried out under Lieutenant (S.B.) R. Grant and Lieutenant (S. B.) K. B. Latimer. Lieutenant Commander (S.B.) C. R. Cowan has devoted a large part of his time to the design and development of light, inflatable life-jackets for use in hot climates.

In association with Dr. Burton, Surg. Lieut. J. M. Parker is continuing experiments on protection against blasts. Surg. Lieut. Parker carried out experiments on the toxicity of a new therapeutic agent used in motion sickness. Attempts to conduct sea trials on this and other agents in transoceanic convoys were made on several occasions. For the most part these proved unsatisfactory due to unsuitable weather conditions.

A survey on methods of assessing "climatic fatigue" in ships was made. Surg. Lieut. Commander E. A. Sellers and Surg. Lieut. W. S. Fields have visited centres in the United Kingdom and the United States in connection with these studies.

Surg. Lieut. Commander Sellers and Mr. E. S. Goranson have continued their work on the study of shock after burns. The effect of adrenal cortical hormone on



capillary permeability and sodium balance was investigated. Metabolic changes with different forms of treatment are now being studied. Surg. Lieut. Parker, L/S.B.A. Murray Irwin and S.B.A. Russell Short are also associated in this work.

Lieut. (S.B.) N. R. Stephenson and Nursing Sister (Tech.) O. M. Stock have carried out studies in bone-healing. A clinical investigation on fracture healing was made at the R.C.N. Hospital, St. John's, Newfoundland, in collaboration with Surg. Lieut. Commander F. Woolhouse, and experimental studies were carried out in this Department. In preliminary experiments choline was shown to have little effect on the retention of radio-active phosphorus in healing bone lesions.

Surg. Lieut. William Locke (later replaced by Sub-Lieut. (S.B.) J. J. Russell) started an investigation on liver injury produced by certain toxic chemicals in normal and choline deficient animals. Prothrombin, bromsulphalein, phosphatase and other liver function tests were correlated in relation to one another and to pathological findings.

Lieut. (S. B.) K. B. Latimer has assisted Dr. Lucas in producing a quantity of arachin for use in special dietary experiments.

Dr. G. A. Wrenshall has measured the efficiency of a freezing unit designed to provide fresh water from salt water during emergencies at sea.

Lieut. (S.B.) C. R. Shorney has continued work on the fitting of contact lenses and also to advise on optical requirements in the Navy.

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## AVIATION, NAVAL AND CIVILIAN WAR RESEARCHES

## AVIATION MEDICAL RESEARCH

In December of 1938 the late Sir Frederick Banting was requested by Major A. A. James of the Royal Canadian Army Medical Corps to undertake aviation medical research in the Banting and Best Department of Medical Research. Sir Frederick and his colleagues in collaboration with other members of the University of Toronto drew up a programme of research which was based on further discussions with members of the Royal Canadian Army Medical Corps attached to the Royal Canadian Air Force. Emphasis was given to the investigation of problems relating to the medical selection of personnel for pilots, ground-crew, etc., and to the development and testing of equipment intended to protect aviators flying in modern high-speed aircraft at very high altitudes.

As Head of the Banting and Best Department of Medical Research, Sir Frederick Banting's greatest contribution to aviation medical research was to form, and find adequate support for, a national committee for the investigation of aviation medicine. This committee, first known as the Committee on Aviation Medical Research, was formed in June, 1939, as an inter-departmental group under the authority of the then Deputy Minister for National Defence, with Sir Frederick Banting as Chairman. In June, 1940, the Committee was dissolved and reconstituted by authority of an Order-in-Council as the Associate Committee on Aviation Medical Research of the National Research Council of Canada with Banting as Chairman.

Sir Frederick Banting acted as Chairman of the Associate Committee until his death in February, 1941. Before his tragic passing, however, he had firmly established a national vehicle for carrying out aviation medical research, and as Chairman he found support and civilian personnel for carrying out much of the programme. Moreover, most of the experimental projects which later proved to be so important were initiated through or sponsored by the Associate Committee on Aviation Medical Research while he was Chairman. Colonel Duncan Graham, Head of the Department of Medicine, University of Toronto, and Vice-Chairman of Banting's Committee, was appointed Chairman in 1941.

Sir Frederick Banting's contribution to aviation medicine consisted of more than the establishment of the Associate Committee on Aviation Medical Research. He diverted his entire Department from so-called peace-time work to the investigation of urgent war problems, chiefly aviation medicine. He released two of his senior colleagues to full-time prosecution of aviation medical research within the R.C.A.F. Banting personally associated himself with his colleagues in the development of protective suits against the effects of acceleration, in fundamental studies in respiration at simulated high altitudes and in the testing and improving of oxygen equipment. Finally, while acting in his capacity as liaison officer between the groups working on aviation medicine in Great Britain and Canada, Sir Frederick Banting met his death.

Professor G. E. Hall in collaboration with Sir Frederick Banting formulated a research programme on medical selection of R.C.A.F. recruits. A battery of tests then standard was validated while new methods were examined. Included amongst the tests were: electrocardiograph, electroencephalogram, tilt table, "40 mm. Hg test," spirometer, altitude chamber. Professor Hall designed special bail-out oxygen equipment and was associated with the development of the low-temperature low-pressure testing unit constructed at No. 1 Initial Training School, R.C.A.F., Toronto. In 1940 Professor Hall entered the service of the Royal Canadian Army Medical Corps attached to the R.C.A.F. Later when the Medical Branch of the R.C.A.F. was established Group Captain Hall acted as medical administrator in



charge of medical research in the R.C.A.F. and was Chairman of both the Subcommittee on Oxygen Equipment and the Subcommittee on Protective Clothing of the Associate Committee on Aviation Medical Research. He retired from the R.C.A.F. in December, 1944, at which time he assumed his new duties as Dean of Medicine and Professor of Medical Research, Medical School, University of Western Ontario.

Professor W. R. Franks took an interest in all aspects of aviation medicine, but gave special thought to the protection of aviators against such adverse effects of acceleration as the draining of blood from the head with consequent dimming of vision, loss of vision and eventually loss of consciousness. From early experiments performed in the Department on animals Professor Franks noted that these adverse effects could be minimized by counter-balancing the body fluids with a protective layer of water external to the animal. From this fact Professor Franks developed a hydrostatic suit which when tested in aircraft afforded protection to the aviator against acceleration. Professor Franks and the late Sir Frederick Banting initiated the development and construction of the human centrifuge at No. 1 Initial Training School, R.C.A.F., Toronto. In 1940 Professor Franks joined the Royal Canadian Army Medical Corps attached to the R.C.A.F. Later, as a Medical Officer in the R.C.A.F. Medical Branch and as a representative of the Associate Committee on Aviation Medical Research, Wing Commander Franks perfected the development of the protective suit in the United Kingdom in collaboration with the R.A.F. Physiological Laboratory.

In November, 1940, the late Sir Frederick Banting invited Professor H. C. Bazett, Head of the Department of Physiology, Medical School, University of Pennsylvania, Philadelphia, to come to the Banting and Best Department of Medical Research as a visiting Professor. In the Great War, 1914-1918, Professor Bazett had performed outstanding work while a Medical Officer in the R.A.F. Medical Service. After a short stay in Toronto Professor Bazett returned to Philadelphia but on the untimely death of Sir Frederick Banting, President Cody and the Board of Governors requested Professor Bazett to come back to the University of Toronto and take charge of the civilian programme in aviation medical research. Shortly thereafter Professor C. H. Best was appointed Director of the Department to succeed his former colleague, Sir Frederick Banting. Professor Best was most anxious to have Professor Bazett continue to direct the efforts of the civilian group on aviation medical research and this arrangement was continued. The problems studied included decompression sickness, protection of aviators against cold, development and improvement of oxygen equipment, and certain aspects of personnel selection. Professor Bazett contributed to the fundamental knowledge concerning, and of therapy for, decompression sickness and developed new equipment for pressurized breathing. In collaboration with members of Surgeon Captain Best's Naval Medical Research Division, Professor Bazett developed marine life-saving equipment. Professor Bazett was an active member of the Associate Committee on Aviation Medical Research and its Executive, and he was chiefly responsible for the formation of the Subcommittee on Aviation Medical Research. During 1943 he was sent to the R.A.F. Physiological Laboratory in England by the Associate Committee on Aviation Medical Research where he carried out successful flight trials of pressure-breathing apparatus, which were of great and immediate significance to R.A.F. reconnaissance crews. On Professor Bazett's return from Britain in the summer of 1943 he was recalled by the University of Pennsylvania to resume his urgent teaching and administrative duties there.

In 1940 Dr. J. A. Bateman began work on aviation medicine in the Department on a war-time appointment. In collaboration with Dr. J. A. Kitching, Dr. Bateman studied the effects of low partial pressures of oxygen on respiration and brain meta-



bolism of mammals. Later Dr. Bateman reported on factors involved in bubble formation of blood, a study which was fundamental to the knowledge of decompression sickness. In 1942 Dr. Bateman took up research in naval medicine and in 1943 he resigned from the Department to accept a position in the Aero-Medical Research Laboratory, Mayo Clinic, Rochester, Minnesota.

While holding a war-time assistantship in the Department, Mr. A. N. Bentley assisted with an investigation of the physiological and psychological effects of cold on personnel. Mr. Bentley also collaborated with other members of the Department in the development and testing of such articles of flying clothing as boots, mitts, gloves and automatic heat regulators for electrically-heated flying clothing. In 1943 Mr. Bentley resigned in order to join the United States Army.

In 1940 Dr. Edgar C. Black joined the Department on a war-time appointment. In collaboration with Sir Frederick Banting and Professor J. K. W. Ferguson of the Department of Pharmacology, Dr. Black studied human respiration in relation to aviation. This work led to the testing of British, American and German oxygen-breathing equipment. Improvements were made on the newly developed British oxygen mask with respect to the resistance of the mask towards freezing. During 1941 Dr. Black collaborated with Wing Commander J. K. W. Ferguson, then of the R.C.A.F. Medical Branch, in devising the R.C.A.F. oxygen mask, and in December of 1941 a freeze-proof oxygen mask assembly was developed for use by passengers flying the North Atlantic in transport aircraft. In December, 1941, Dr. Black was appointed Secretary of the newly formed Subcommittee on Oxygen Equipment of the Associate Committee on Aviation Medical Research. During 1942 he gave the major part of his time to expediting the pilot production of R.C.A.F. oxygen equipment under a contract to the National Research Council. He also prepared several chapters and edited a new R.C.A.F. publication entitled *Manual of Oxygen and Intercommunication Equipment*. During 1943 Dr. Black edited the second edition of this *Manual* and gave assistance in the testing and production of the R.C.A.F. oxygen demand valve and in the testing of rubber substitutes for the R.C.A.F. oxygen mask. In February, 1944, Dr. Black was appointed Honorary Secretary of the Associate Committee on Aviation Medical Research which post he held until his retirement in September, 1944, when he accepted a temporary appointment in the Department of Physiology, Dalhousie University, Halifax.

During 1940 Dr. A. C. Burton considered various theoretical aspects of physiology in relation to aviation medicine, particularly the problem of protecting aviators against cold. During 1941 he designed and constructed an "artificial man" for testing the insulating efficiency of flying clothing. This study was extended during the latter part of 1941 and on into 1942 to the testing of a wide range of fabrics. In collaboration with other members of the Department, Dr. Burton determined the efficiency of electrically-heated flying clothing and did work on the development of an automatic heat regulator for flying suits. In collaboration with Mr. Graham Macdougall, Dr. Burton studied the oxygen consumption of personnel while wearing heavy flying clothing in the cold. Dr. Burton also devised a rapid and convenient method for determining the cooling power of air. During 1943 he collaborated with members of Professor Best's Naval Medical Research Division in the development of flashing lights for flotation jackets. During 1944 and 1945 Dr. Burton turned his attention to clothing problems of the Canadian Army. In August, 1945, he resigned from the Department to take up new duties in the Department of Medical Research, Medical School, University of Western Ontario.

Mr. J. E. Goodwin of the Department carried out an extensive investigation on the possible use of the electroencephalogram as a routine means of selecting aircrew. On the basis of this work begun in 1940, and also of independent studies



made by the R.C.A.F. Medical Branch, the use of the electroencephalogram was abandoned by the R.C.A.F. as an aid in personnel selection. From 1943 on, Mr. Goodwin collaborated with Dr. G. F. M. Smith of this Department in the study of acoustics and intercommunication equipment.

Dr. J. A. Kitching came to the Department on a war-time appointment in 1940. During 1940 Dr. Kitching collaborated with Dr. Bateman on studies of brain respiration and metabolism. In 1941 Dr. Kitching undertook the measurement of a possible decrease in human efficiency while performing various mental and mechanical tasks in the cold. The subjects performed their mechanical tasks with no loss in efficiency until their hands became numb with cold. As an outcome of this experience Dr. Kitching reviewed the problem of clothing the hands and shortly developed a new type of glove consisting of an inner silk lining and an outer cover curved to fit the hand. Collaborating with other members of the Department and also Medical Officers from No. 1 Clinical Investigation Unit, R.C.A.F., Dr. Kitching developed a new R.C.A.F. flying suit. In February, 1942, Kitching was appointed Secretary of the newly formed Subcommittee on Protective Clothing of the Associate Committee on Aviation Medical Research. Dr. Kitching supervised the development of the Subcommittee's fabric library. In 1943 he was sent as a liaison officer by the Associate Committee on Aviation Medical Research to the R.A.F. Physiological Laboratory in Britain where he assisted with the production of pressurized breathing equipment. In 1944 Dr. Kitching collaborated with Dr. A. C. Goodings of the Ontario Research Foundation in important studies on the permeability of fabrics to water vapour. On his resignation from the Department in August, 1945, Dr. Kitching returned to Britain to assume his teaching duties in the Department of Zoology, Bristol University.

Mr. Graham R. Macdougall was awarded a war-time appointment in the Department in 1941. He assisted Dr. A. C. Burton in the measurement of thermal insulation of numerous articles of flying clothing. During 1942 Mr. Macdougall assisted Professor Bazett in studies on pressurized breathing. Early in 1943 Mr. Macdougall resigned from the Department to accept a commission in the R.C.N.V.R.

Dr. J. W. Thompson joined the Department in 1941 on a war-time basis and resigned in 1942 to accept a commission as a Medical Officer in the R.C.A.F. Medical Branch. While a member of the Department Dr. Thompson assisted Dr. A. C. Burton in the testing of electrically-heated flying clothing. Dr. Thompson also collaborated with Professor Bazett in studies on a prophylactic treatment for decompression sickness.

Dr. Edouard Pagé joined the Department on a war-time basis in 1941. Under the direction of Professor Bazett, Dr. Pagé completed a study of vitamin deficiency in rats begun by a medical officer of the R.C.A.F. Medical Branch. Dr. Pagé carried out preliminary studies on the distension of the digestive tract during barometric decompression. In the absence of Dr. Kitching in 1943, Dr. Pagé carried out the secretarial duties of the Subcommittee on Protective Clothing. Late in 1943 and the early part of 1944, Dr. Pagé developed an exposure suit for use by airmen forced to bail out from aircraft at sea. In September, 1944, Dr. Pagé resigned from the Department to take up new teaching duties in the Department of Biochemistry, Faculty of Medicine, Laval University, Quebec.

Dr. G. F. M. Smith joined the Department on a war-time appointment in 1942 and until 1943 he assisted Mr. Goodman in the validation of the use of the electroencephalogram as an aid in personnel selection. During 1943 Dr. Smith collaborated with Dr. Black of this Department in the testing of oxygen masks. He also collaborated with Mr. Goodwin in the study of acoustics and intercommunication equipment. In September, 1944, Dr. Smith was appointed Secretary of the Subcommittee on Oxygen Equipment and Honorary Secretary of the Associate Com-



mittee on Aviation Medical Research. During 1944 and 1945 he collaborated with Dr. Black in editing a third edition of the R.C.A.F. *Manual of Oxygen and Intercommunication Equipment*. He resigned in September, 1945, to take up new teaching duties in the Department of Biology, University of New Brunswick, Fredericton.

#### NAVAL MEDICAL RESEARCH

The Naval Medical Research Division was set up by the naval service, with Surgeon Captain C. H. Best (Director of the Banting and Best Department of Medical Research) as Director, in 1941. This Division was the working unit of the Associate Committee on Naval Medical Research of the National Research Council.

(1) *Life-saving equipment*. Work in this field was carried on by various members of the Division but chiefly by Lieutenant Commander (SB) C. R. Cowan who developed the life-saving jacket which was officially adopted by the R.C.N. This jacket was improved from time to time as a result of discussion with survivors. The model in production at the end of the war satisfied all the following requirements: adequate flotation, protection from underwater blast, warmth for personnel above decks in cold latitudes and conservation of body heat of survivors, as well as lightness when rescuing a man from the water.

Through the joint efforts of the Division and the Subcommittee on Protective Clothing of the Associate Committee on Aviation Medical Research, a flashing type of life-saving light was developed and incorporated in the jacket. The jacket and light were responsible for saving many lives after some of the sinkings in the North Atlantic.

(2) *Seasickness*. Practically all members of the Division played some part in the extensive work carried out on this problem. Most directly concerned were Surgeon Lieutenant Commander E. A. Sellers, Surgeon Lieutenants J. M. Parker and W. S. Fields, and Lieutenant (SB) N. R. Stephenson. Swings were built at H.M.C.S. *York* and extensive studies made by Division personnel. Chemical investigations were carried out in the Banting and Best Department and sea trials held on the eastern seaboard of the United States and Canada and in the United Kingdom. Nearly 25,000 individuals were tested with many different remedies by the various working groups of these three countries. A mixture of hyoscine, hyoscyamine, and a new barbiturate developed by Dr. Robert Noble of McGill University, was the final recommendation made by the R.C.N. Medical Research Division.

(3) *Shock*. A method for evaluating blood substitutes was developed and extensive comparisons of rat plasma, saline, 4 per cent isinglass and 4 per cent polyvinyl alcohol solution were made. Polyvinyl alcohol solution was most effective in treating the type of shock produced in this species. Surgeon Lieutenant William Locke and Nursing Sister (Tech.) O.M. Stock were chiefly responsible for these and other related projects.

(4) *Experimental work on burns*. This work was carried out under the direction of Surgeon Lieutenant Commander E. A. Sellers, assisted at various times by Mr. J. H. W. Willard, Mr. E. S. Goranson, Surgeon Lieutenant J. M. Parker, Warrant Officer J. Scattergood and other naval personnel. A standardized burn was produced on the extremities of anaesthetized dogs of such a nature that death occurred in over 50 per cent of cases. The burned area was estimated as about 35 per cent of the total body surface. It was shown that when plastering was carried out immediately after the burn, mortality from shock was markedly reduced.

Another series of experiments was performed to show whether any benefit in the prevention of shock is derived from later application of plaster or from compression dressings. It was found that if plaster was applied within one hour of



burning, there was a significant decrease in the mortality rate. The mortality rate of the compression-dressings treated group did not differ significantly from that of the control group.

(5) *Protective clothing and equipment.* A clothing section was set up in this Department which included Lieutenant Commander (SB) C. R. Cowan and Lieutenant (SB) Russell Grant as well as three naval ratings. This group, augmented from time to time by other members of the Division, carried on a wide range of development work on specific garments and equipment to meet the requirements of the R.C.N. Among the problems investigated were the following: the insulating value of various types of fabrics, the study of buoyancy, air permeability, vapour permeability, the absorption and evaporation of moisture from the surface of various cloths and fabrics, the study of functional designs leading to superior protective clothing, investigation into the after-treatment of fabrics to impart such properties as flame-proofing, mildew-proofing, water repellancy, water-proofing, fluorescence, gas-proofing and insect-proofing.

Large-scale service trials on protective clothing and equipment were organized by members of the Division and carried out at sea during the winter of 1943-44. Some 150 different types of clothing were tested on all classes of ships operating in the R.C.N. as well as on some United States ships. Among the recommendations arising from these trials which were adopted by the Royal Canadian Navy are the following:

- (a) A new type of rainproof garment to replace oilskins;
- (b) A new type of cold-weather working garment to replace duffle coats;
- (c) Modification of the winter cap;
- (d) New type of two-piece mitt;
- (e) Heavier type of socks to replace stockings;
- (f) Modifications to the weatherproof protective suit;
- (g) New type of cold-weather footgear already in use in the R.C.A.F.

Similar trials were conducted in the winter of 1944-45 on a smaller scale by members of the clothing section, which were a continuation of the work started in 1943-44.

(6) *Optical work.* Lieutenant (SB) C. R. Shorney, the senior optician in the naval service, has carried on a considerable amount of work in this Department. This included a study of the dispensing of service glasses which resulted in a great improvement in the frames used and adoption of a new design. Other suggestions were made to improve the optical work in the Navy through a change in the method of awarding optical contracts to lens manufacturers. An R.C.N. Optical Section was organized and highly qualified men, opticians in civilian life, were selected and given the rank of Warrant Officer (SB). After a period of training in ophthalmic techniques in the Navy given by Dr. A. E. MacDonald and Lieutenant Shorney, these men were assigned as base opticians to the various naval bases in Canada.

To assure a sufficient quantity in a proper size range of service frames, optical stores were organized at Toronto where all frames and accessories were kept on hand. This greatly facilitated the work of the base opticians.

The fitting of contact lenses was undertaken with a view to the re-establishment of experienced men whose vision prevented them from accepting sea-going appointments. These contact lenses have been used to a limited degree at sea and have been found very satisfactory. Many are able to wear lenses from ten to twelve hours per day.

(7) *Special equipment.* The prevention of "tearing" of the eyes in high winds can be prevented with certain types of goggles from which the lenses have been removed. Lieutenant Commander C. R. Cowan, Dr. A. E. MacDonald and Surgeon Captain Best conducted a number of wind tunnel tests on handmade



samples of glassless eye-shields and later these shields were tested at sea. Eventually a satisfactory form was developed and a glassless eye-shield produced which gives marked protection with wind force greater than thirty miles per hour.

Considerable research has been carried out on the subject of producing fresh water at sea. Among the methods investigated were the following:

- (a) Collection of rain water;
- (b) Collection of water from expired air;
- (c) Conservation of water by saturation of the clothing with sea water;
- (d) Chemical separation of the salt;
- (e) Distillation of salt water;
- (f) Formation of ice of low salt content from sea water.

It was finally decided that since men were usually rescued within twenty-four hours, the requirements for fresh water could be easily satisfied by the provision of fresh water in sealed containers or by kits of chemical preparations such as the Decalso Units, developed in the United States.

Surgeon Lieutenant Commander C. M. Oake introduced to the Division the advantages experienced at sea by carrying on his person a leather belt fitted with pouches containing an emergency medical kit for use during action. From this idea Lieutenant Commander Cowan developed an apron-type waterproof bag hung around the neck, secured by a waist band and closed by means of a zipper. Part of the equipment in this "battle belt" is an emergency operating headlight. Only one hundred were required and were constructed in the Department.

(8) *Portable laboratory kit.* Because of a lack of suitable testing equipment for many situations in Sick Bays, both at sea and ashore, plans were drawn up for a portable laboratory kit. This kit provides equipment for performing most of the usual tests.

Lieutenant (SB) N. R. Stephenson designed and assembled one hundred of these laboratory kits for the Navy. Recently the Royal Navy ordered seventy-five complete kits which were prepared by a commercial company, and the Canadian Red Cross Society sent five laboratory kits to China to be used under the direction of Dr. Robert McClure.

(9) *Miscellaneous problems.* Surgeon Lieutenant Commander Sellers and Surgeon Lieutenant Parker carried out a series of experiments to determine the effects of underwater concussion and to obtain leads on methods of protection against underwater concussion. This work was done at the time when the life-jacket was being designed. Rats were exposed with various parts of the body protected by cellular rubber. A number of experiments were also performed in which the animal was surrounded with an air space before being subjected to the blast. It was found that considerable protection was given by a layer of quarter-inch rubber and complete protection was afforded against the standard charge used by an air space around the body.

(10) *Underwater physiology.* The development of self-contained breathing apparatus and its use in shallow water diving from midget submarines made it seem advisable to conduct a survey on underwater problems of interest to the R.C.N. After reviewing the subject in all its aspects, Surgeon Lieutenant Commander E. J. Delorme and Surgeon Lieutenant William Locke submitted a report on their findings. One of the principal problems in shallow water diving or in using self-contained breathing units, is that of oxygen poisoning. It was recommended that a large, suitably constructed, high pressure tank should be constructed by the R.C.N. for research purposes and the treatment of decompression sickness. Work was started on the design of an instrument to control oxygen concentration in the breathing mixture of a self-contained unit.



(11) *Fracture healing.* Lieutenant (SB) N. R. Stephenson and Nursing Sister (Tech.) O. M. Stock carried on an investigation of fracture healing by experiments with rats in which the bone phosphatase was determined after a standardized bone injury. A study was also made of the effect of a choline deficiency on the uptake of radio-active phosphorus in bone ash. It had previously been found that certain patients at the R.C.N. Hospital in St. John's, Newfoundland, exhibited a delayed union of large fractures. Chemical studies had shown that the level of inorganic phosphorus was lower in patients with delayed union than it was in other groups. Other constituents, calcium, protein and vitamin C, were essentially the same for all the patients. In rats it was found that, after injury, bone phosphatase increased markedly between the third and seventh day. By the end of three weeks the phosphatase content of the injured area had returned to normal.

(12) *Dietary factors in liver injury.* A great deal of interest has been exhibited recently in the study of the factors involved in liver injury. Surgeon Lieutenant Locke and Sub-Lieutenant J. J. Russell have studied, with Dr. Best, the dietary factors associated with the maintenance of normal liver function in dogs and have been engaged in finding suitable tests which will indicate the extent of the damage done to the liver. The effect of these tests on adding choline to a diet deprived of protein has been studied.

Dogs receiving choline showed, on the average, lower bromsulphaline retention and a lower plasma alkaline phosphatase than the animals not receiving this base.

#### CIVILIAN MEDICAL RESEARCH

The group assigned to the study of chemical warfare consisted of Dr. D. A. Irwin, Dr. C. C. Lucas, assisted by Dr. V. Collins, Mr. L. B. Macpherson and Dr. J. M. R. Beveridge. The work undertaken was a study of the lesions caused by vesicants. Dr. H. M. Macrae, of the Department of Ophthalmology, gave invaluable assistance in the study of the eye lesions and Dr. N. M. Wrong (dermatologist) collaborated in the work on skin lesions.

Lesions due to liquid and vapour contamination by mustard gas, lewisite and other vesicants were studied in the gross and histologically. Prophylactic and therapeutic studies were made following some preliminary determinations of acute and chronic toxicities.

The distribution of arsenic in the organs of animals poisoned by lewisite (applied externally) was determined by Dr. C. C. Lucas and Dr. J. M. R. Beveridge with the assistance of Miss Margaret Wheatley and Mr. Arcari.

Dr. Lucas, assisted by Mrs. F. Semmons, completed some work started by Dr. Hugh Barrett in the Department of Physiological Hygiene on the acute toxicity of phosgene for Rhesus monkeys.

Dr. Irwin collaborated with Dr. G. E. Wright and other members of the Department of Chemistry in the study of certain highly toxic gases and smokes which produce lung injuries.

A movie film, in colour, showing the development of eye lesions following contamination with vesicants was prepared in the Department. The beneficial effects of certain treatments were also illustrated. This film was duplicated and used for training purposes by the armed services.

Large-scale production of penicillin in the Spadina Division of the Connaught Laboratories during the final year of the war was in a large measure made possible by preliminary investigations conducted in the Banting Institute. As early as 1940, Dr. Philip H. Greay, in the Department of Pathology and Bacteriology, had made some attempts to grow the mould *Penicillium notatum* with a view to production of penicillin on a large scale in Canada. Dr. C. C. Lucas and Dr. C. von



Seemann, of this Department, devoted some time to investigating improved methods of extracting the active principle. In August, 1942, soon after the announcement of the highly successful results of Professor Florey's group at Oxford, Dr. Greey, assisted by Dr. Alice Gray, began a serious attempt to carry on similar work in Toronto. These cultural studies, which were designed to determine the best conditions for growing the mould to produce high yields of penicillin, progressed so favourably that application was made to the National Research Council for a grant to enable all phases of the problem to be attacked with greater vigour. This application was favourably received and funds were made available to Dr. Greey and Professor C. H. Best for expansion of the work going on in the Banting Institute, the object being to determine methods of growing the mould on a still larger scale and to devise extraction procedures which could be utilized commercially.

The scale of the culture experiments soon reached such a magnitude that the capacity of the sterilizers in the Banting Institute was exceeded. The Toronto General Hospital generously offered the use of its large sterilizing facilities and provided some essential equipment required to handle the increasing volumes of liquid.

Professor C. H. Best turned over the facilities of the biochemical section of the Department to the investigation of isolation procedures amenable to adoption in a plant working on a commercial scale. The extraction problem was assigned to Dr. S. F. MacDonald. Within three months preliminary experiments had pointed the way to a method which seemed promising and construction of a pilot plant was begun to test the behaviour of the process on a larger scale. This pilot plant was used as an experimental unit in which various problems associated with large-scale production were studied. Numerous small improvements were effected and a process which appeared to be adaptable to commercial-scale production of penicillin was worked out.

The principles involved were not new but some of the practical details encountered in handling such a labile substance in large quantity had to be worked out. Counter-current extraction at lowered temperature, careful pH control and utilization of a suitable buffer (to avoid strong alkalis) for the re-extraction into water were the main features. An ingenious method of removing excess buffer, devised by Dr. MacDonald, was a definite contribution to the production of a sodium salt of penicillin with high activity.

### THE MEDICAL SOCIETY

*September, 1944, to June, 1945*

<i>Honorary President</i> .....	Dean W. E. Gallie
<i>Honorary Secretary-Treasurer</i> .....	Dr. W. H. T. Baillie
<i>President</i> .....	J.M. Stephenson
<i>Vice-President</i> .....	R. B. Slater
<i>Treasurer</i> .....	J. M. Finlay
<i>Secretary</i> .....	C. G. Hill

During the war years the Medical Society has managed to exist as an organization, but it has not advanced its position in the scheme of things in the Medical School to any noticeable extent. With the general apathy of the students towards the society, an apathy it has shared with everything else, the past executive is indeed to be commended for keeping the institution alive. It is felt by the executive that on the framework provided by the old society, and with the injection of a little new blood and determination by the returned men the society may be able



to grow into a more useful organization. By this I do not wish to imply that in the past it was not useful, but like most institutions it has had alternating periods of ascent and decline. This is dependent on the nature of the students, the outlook of the Faculty, and the stresses of the times. From the time of the depression it would appear that the Society has been on a decline in certain aspects but on the ascent in others. Most important, although it may have risen in the mind of the Faculty, this has not been true to the extent observed in similar organizations in other (more progressive) universities.

It is my hope that this Society may fill a place which has been glaringly empty since the founding of this School, that is, as a promoter of medical citizenship and of affection for the School. We will not delude ourselves in regard to the attitude of the students who graduate. Their medical training has been as good or better than they would receive elsewhere but they have few kind words to say for Toronto University except in argument. Until this year they have not attempted any relations with the School but at the moment excellent connections have been initiated between the Society and the Alumni Executive.

I have not included in this report a long list of events and activities of the Society for the last year but I do wish to congratulate the executives of the various committees and subsidiary organizations. I must say they have managed affairs very well this last year. This is reflected in the excellent financial state of the Society. In regard to this it is interesting to note that the Medical Society has the smallest per capita budget of any student body on the campus and yet has managed to keep its head above water. If aid is not forthcoming soon other financial arrangements will have to be made to maintain our position on the campus.

It is planned next fall to do everything we can to improve the state of the Society and at the same time to attempt to instill some enthusiasms into its members for social, cultural, athletic, educational and communal pursuits. In our aims we may have attempted more than we will achieve but I feel certain that if we are not successful the executive which will follow us will be of sufficient determination to carry on until these are achieved. To it I wish every success.

J. M. STEPHENSON,

*President.*

### MEDICAL ATHLETIC ASSOCIATION

*September, 1944, to June, 1945*

<i>Honorary President</i> .....	Dr. W. A. Dafoe
<i>President</i> .....	G. A. Lewis
<i>Vice-President</i> .....	I. Strathman
<i>Secretary-Treasurer</i> .....	J. W. Hazlett
<i>Quartermaster</i> .....	J. H. Davies
<i>Assistant Quartermaster</i> .....	J. S. Spooner
<i>Publicity Manager</i> .....	E. W. Gentles
<i>Sixth Year Representative</i> .....	F. P. Giardine
<i>Fifth Year Representative</i> .....	J. W. Fyfe
<i>Third Year Representative</i> .....	J. K. Strathearn
<i>Second Year Representative</i> .....	E. G. Cross
<i>First Year Representative</i> .....	W. A. Cochrane



Medicine has again completed a very successful season in Athletics. Although Meds. failed to retain the T.A. Reed Trophy, they continued to rank high and were only 38 points behind Trinity who won the award. If they continue to show such enthusiastic participation, they will again turn in a successful season next year.

This year, 80 per cent of the student body participated in team sports but why cannot we strive for 100 per cent participation? "All work and no play makes Jack a dull boy" is as true among medical students as elsewhere. Surely a healthy body is as important as a healthy mind to Canada's future doctors. Thus I hope that next year, Meds. will surpass all athletic endeavours they have ever shown.

The colour awards started under the previous executive were put into effect this year and all are agreed that such an award is well worth striving for.

Despite the colour award system and our increase in team participation, the Athletic Association ended the season with a minimal debt compared to our programme.

In conclusion I would like to pay tribute to our President, George Lewis, who was the big cog in the wheel of Medical Athletics, not only as an executive but also as an outstanding athlete. George was awarded the Medical Athletic Stick, and in addition the George M. Biggs Trophy awarded each year to the outstanding athlete of the graduating class in the University for leadership, sportsmanship and performance.

The executive wishes to thank all managers and participants for their share in all Meds. achievements.

JAMES H. DAVIES.

## MEDICAL WOMEN'S UNDERGRADUATE ASSOCIATION

1944-1945

<i>Honorary President</i> .....	Dr. M. Kerr
<i>President</i> .....	Miss A. Tate
<i>Vice-President</i> .....	Miss D. M. Beaton
<i>Treasurer</i> .....	Miss D. M. K. Mann
<i>Secretary</i> .....	Miss W. G. Train

In the fall the Medical Women's Undergraduate Association arranged for the incoming first year girls to be met on the opening day of school by the sixth year students. They were shown around the University and registered in classes and afterwards entertained at a luncheon. In October a tea was held for the medical alumnae in the common room in the medical building. In the spring of 1944 this room was redecorated, the undergraduates doing nearly all the work. In December the Christmas party for the undergraduates was held at Dr. Kerr's home, and toys were sent to the Settlement School as a Christmas contribution from the Medical Women's Undergraduate Association. In February the graduating class was entertained at the School of Nursing. It was decided to postpone the annual spring Nabob Tea until the fall of 1945. The number of women entering Medicine is gradually increasing and it was felt that it would be desirable to secure a residence for medical undergraduates in 1945-46. Attempts were made by both the 1944 and 1945 executives to make satisfactory arrangements for a residence on St. George Street. An encouraging response was obtained to the application forms, but unfortunately we were unable to obtain the house for the coming school session. However the M. W. U. A. are hoping that within the next few years some form of residence can be provided for the undergraduates.



**MEDICAL WOMEN'S ATHLETIC ASSOCIATION**

<i>President</i> .....	Charlotte Hahn
<i>Vice-President</i> .....	Lois Davies
<i>Secretary-Treasurer</i> .....	Natalie Staron

Among the medical women this year enthusiasm for athletics ran high. More teams than ever before competed in interfaculty sports. Two teams were entered in basketball, and one in hockey, baseball, volleyball and swimming. Although no awards were taken, Meds. did come very close to winning the basketball championship. The managers of the teams deserve a great deal of credit. Many of the girls showed themselves able participants in the track and field events.

Because of the lack of funds, social events were curbed this year. However, many members had a great deal of fun competing in an inter-year bowling contest.

It is to be hoped that enthusiasm for athletics and participation in sports will continue to increase next year.











